PAOGRES

FIVE DOLLARS PER YEAR

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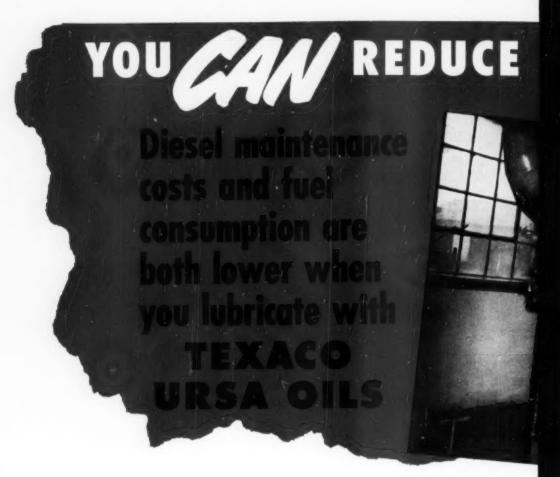
TRANSPORTATION

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IN INDUSTRY

APRIL, 1950

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As operators everywhere have discovered, Texaco Ursa Oils reduce Diesel maintenance costs and fuel consumption... assure full-power, trouble-free performance. They do so by keeping engines clean.

Use Texaco Urza Oils and note, at scheduled overhauls, the absence of harmful carbon, gum and sludge formations that so often plague the user of ordinary oils. Texaco Ursa

Oils have truly remarkable resistance to oxidation. Note, too, how Texaco Ursa Oils keep rings free, valves active, ports open . . . assure better compression and combustion... longer life for engine parts.

Texaco Ursa Oils are approved by leading Diesel manufacturers and are easily America's most preferred Diesel lubricants. In fact more stationary Diesel h.p. in the U.S. is lubri-

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TEXACO STAR THEATER
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on television
every Tuesday night.
See newspaper for
time and station.



TEXACO



cated with Texaco Ursa Oils than with any other brand!

A Texaco Lubrication Engineer will gladly help you get the most from your Diesels. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York. One of four Diesels operated by Sidney (Nebraska) Public Utilities. All engines are lubricated with Texaco Ursa Oils, and Manager Vern Livingston reports excellent records of efficiency and operating economy.

URSA OILS

FOR ALL DIESEL ENGINES

The World's Finest Fleet of DIESEL ELECTRIC-DRIVE TOWBOATS



Owned and operated by the Moran Towing and Transportation Company, Inc., New York City, and powered by General Motors, these modern tugs dock and sall the world's largest and finest ocean liners. Owners and operators of these magnificent ships know that these Diesel-Electric tugs, with their instantaneous control, provide smooth, shock-free handling of their vessels, insuring comfort of passengers and crew, saving time, and eliminating incidental ship damage.

Leader in Diesel engineering development for 38 years

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS



ENGINES FROM 150 TO 2000 H. P. General Motors Diesel-Electric Drive has pow-ered more than 700 vessels in 22 different

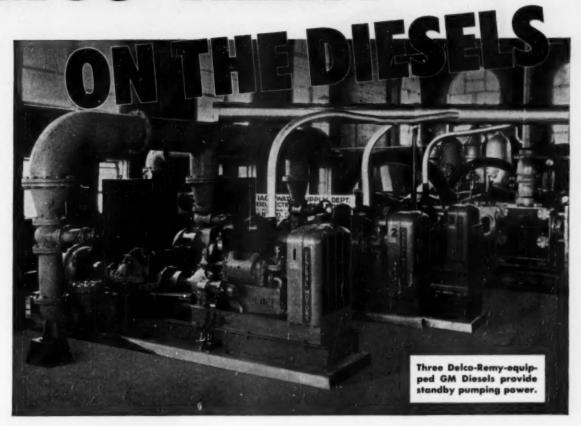
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DIESELS ON THE JOB

These Diesel engines furnish power for emergency water pumping. They *must* be dependable—and Delco-Remy electrical units make a real contribution to that dependability.

Since the earliest days of the Diesel industry, Delco-Remy has cooperated closely with makers of Diesel engines to provide them with electrical units that are right for the job.

Diesel engine manufacturers and users know the name Delco-Remy is their assurance of good performance.



DELCO-REMY—A UNITED MOTORS LINE Service Parts and Delco Batteries Available Everywhere Through UNITED MOTORS DISTRIBUTORS

Delco-Remy

Division, General Motors Corporation

ANDERSON, INDIANA

DELCO-REMY . WHEREVER WHEELS TURN OR PROPELLERS SPIN

APRIL 1950

3

TROUBLE Defore it STARTS!

"I am De Laval Centrifugal Force. I am expert at removing dirt from Diesel lubricating

oil. If any water is present in the oil, I get rid of that, too. Because I give double-barreled protection to the engine, I stop trouble before it starts."

De Laval centrifugal force does its job thoroughly. Dirt is stored in the bowl, outside the zone where purification takes place. Water is continuously discharged after being thrown out of the oil.

The De Laval "Puri-Filter" goes one step further and removes colloidal carbon as well — the ultimate in Diesel lubricating oil maintenance.

THE DE LAVAL SEPARATOR COMPANY 165 Broadway, New York 6 427 Randolph St., Chicago 6 DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5 THE DE LAVAL COMPANY, Limited, Peterborough, Ont. When used to purify Diesel fuel oil, De Laval centrifugal force enables the engineer to get maximum BTU value from the oil. Clean fuel oil means freedom from excessive abrasion and wear on cylinder linings and piston rings.



De Laval



THEY BURNED THE MORTGAGE IN LESS THAN 10 YEARS

An Arkansas town started a power generating plant over 10 years ago with three Superior Diesels. When they threw the switch on this new venture they had a \$49,000 debt. In less than 10 years they burned the mortgage.

Since this municipal power plant started operations, it has paid over \$122,000 in power dividends to the city . . . in free street lights, and 80% discounts to schools, churches, and charities. They added another Superior Engine in 1945 . . . still another in 1946 . . . and bought their sixth Superior Diesel in 1949.

In addition to these dividends and necessary capital improvements, operating profits made it possible to repeal a special tax assessment. Today this Arkansas power plant is debt-free and making a substantial annual profit. Its customers get the lowest priced electrical power in the locality.

Careful supervision plus low cost Diesel power have added another remarkable success story to Superior's files. Chances are a Superior representative can help you accomplish the same results. Why not write and tell us when he should call, or if you prefer, send for our fully illustrated 20-page booklet.

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION

Plant and General Sales Officer Springfield, Ohio



Locomotive Marine Oil Field Stationary

DON'T BE SATISFIED WITH HALF-WAY MEASURES...

insist on
Walseal® products
and be certain



- the FACTORY INSERTED Ring insures FULL PENETRATION of the Silver Alloy . . . a perfect joint

Today, contractors... builders... architects are using brazed connections, in ever increasing numbers on their brass and copper pipe runs. However, they must be certain that the correct brazing alloy is used; that the joint has penetration of alloy up the shoulder of the fitting.

That's why more and more are turning to Silbraz® joints made with Walseal valves, fittings and flanges which assure the proper amount of alloy with no waste. They know that the finished joint not only will withstand hydrostatic pressure, but it will also withstand terrific impact and vibration — in fact, no correctly made Silbraz joint has ever been known to creep or pull apart under any pressure,

shock, vibration or temperature which the pipe itself can withstand.

Furthermore, it is a relatively simple operation to make a Silbraz joint — no heavy scaffolding need be erected... just cut the pipe, flux, assemble, then braze, following the technique recommended by the Walworth Company. A silver brazing alloy — FACTORY INSERTED — in each port flows out when heated with the oxyacetylene torch, making a joint that is stronger than the pipe itself... a one-hand operation, with the mechanic out of the path of the deflected heat — at all times.

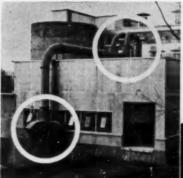
For full information about Silbraz joints made with Walseal products, write for Circular A-1.

WALWORTH

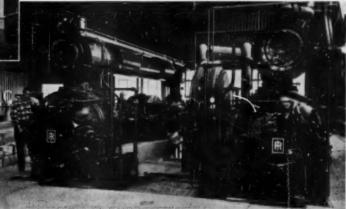
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AAF Filters "team up" on Talc Dust



Talc plant compressor given perfect protection against sub-micron dust particles

THIS huge Ingersoll-Rand PRE compressor supplies the compressed air for operating 14 grinding mills at the new plant of the Gouverneur Talc Company. Converting talc ore to sub-micron size means fine dust and plenty of it—certainly not a healthy diet for compressor operation.

But everything is under control. Air entering the compressor intake first passes through a series of AAF drytype filters for the initial cleaning. Next, it runs the gantlet of two AAF Cycoil* Oil Bath Air Cleaners which remove any remaining trace of talc or other dirt. Final result—super-clean air for compressor operation.

Whatever your dust problem, there's one or a combination of filters in AAF's complete line that can solve it effectively and economically. Get the facts now! Call your nearby AAF representative or write direct for complete product information.

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CUMMINS

are preferred

by transportation men for LOWER-COST OPERATION HIGHER AVAILABILITY



TRUCK TRANSPORTATION



Pacific Intermountain Express has standardized on Cummins Diesels for its long-line operations and uses a total of 132 Cummins-Powered freight

trucks. Cummins Diesels power more heavy-duty trucks than all other Diesels combined.

RAIL TRANSPORTATION

Chicago, Burlington and Quincy is using Cummins. Diesels to drive generating sets on their streamliners and has been using these profit-making engines for more than 15 years. 19 other leading Class I railroads are using Cummins Power in locomotives, motor cars, motor trains, maintenance-of-way equipment,

nance-of-way equipment, switchers, and auxiliary power applications.



BUS TRANSPORTATION



The top performance of Cummins Diesels in railway applications and freight trucks is being duplicated in the bus industry. For example, Queen City Coach Company, one of the largest inde-

pany, one of the largest independent operators in the United States, reports top economy from Cummins-Powered buses on southeastern highways.

50 to 550 HP Highspood Diesel Engines

for: On-highway Trucks • Off-highway Trucks • Buses • Tractors • Earth-Movers • Shovels • Crones • Industrial Locomotives • Air-Compressors • Logging Yarders and Loaders • Drilling Rigs • Centrifugal Pumps • Generator Sets and Power Units • Work Boats and Pleasure Craft

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STANDARD ENGINEER'S REPORT

LUBRICANT RPM Delo Oils

UNIT M. V. Komoku

LUBRICATOR Dry sump

CONDITIONS Jutermittent operation

Capacity loads against strong tides

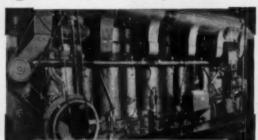
PERIOD 12 years

FIRM LAW Francisco

No stuck rings or bearing failures in 12 years!



HAULING 900-TON-AVERAGE LOADS, the M. V. Komoku's two 275 H.P. high-speed diesel engines have been lubricated with RPM DELO Oils since the vessel was built in 1938. "In all that time," says Chief Engineer R. B. Gibson, "we haven't had ring or bearing



trouble. About 5 years ago we pulled the pistons, but there was so little wear we only installed standard rings. We grind exhaust valves yearly, intakes every two years." RPM DELO Heavy-Duty Lubricating Oil keeps these engines clean and lubricated.



FIVE CATERPILLAR AND BUDA DIESELS are also on the M. V. Komoku to operate air compressors, generators, etc. . . . are lubricated with RPM DELO Heavy-Duty 0il. In varying periods, RPM DELO 0ils have prevented ring, cylinder or bearing trouble in any of them.

REMARKS The M. V. Komoku transports sugar from upper San Francisco Bay to various terminals. Strong tide flow, common in the Bay, often makes heavy going for her engines.

RPM DELO Oils are designed to meet every heavy-duty engine need. Besides RPM DELO Heavy-Duty Oil in the Komoku, the other high-performance grades are RPM DELO Special, RPM DELO Supercharged-1, RPM DELO Supercharged-2 Lubricating Oil.



How RPM DELO OILS keep engines clean and prevent wear



- A. Contain special additives that provide metal-adhesion qualities . . . keep oil on parts whether they are hot or cold, running or idle.
- B. Anti-oxident resists deterioration of oil and formation of lacquer . . . prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.
- C. Special compounds stop corresion of any bearing metal, and oil foaming in both wet and dry sump engines.

FOR MORE INFORMATION about the proper grade of the new RPM DELO 011s to fit your particular requirements, or the complete line of RPM Lubricants, and the name of your nearest "RPM" Distributor, write or call any of the companies listed below.

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Why does practically every major diesel engine manufacturer provide Alnor exhaust pyrometers as original equipment? Because Alnor exhaust pyrometers provide the user with the simplest, lowest cost means of anticipating trouble and breakdowns before they start, of reducing maintenance expenses to a bare minimum, of assuring maximum efficiency and long-lived operation. Exhaust temperature readings give any diesel operator. Exhaust temperature readings give any diesel operator the complete story of engine operation, cylinder by cylinder. Careful readings when new engines are being installed and adjusted mean getting off to the right start: consistent twice-a-day readings throughout the life of the engine can prevent costly wear and expensive failures—to more than pay for the installation of Alnor exhaust pyrometers. If your diesel engines are not equipped with these instruments, chances are that they should be.

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PRECISION INSTRUMENTS FOR EVERY INDUSTRY



This International-Harvester Diesel has its power protected by Purolator Micronic* Oil Filters.

Workin' on the railroad is tough on engines.

When it's kicking dirt and gravel down the tracks, your Diesel is at the mercy of engine-wrecking abrasives that creep into the oil stream. Unless this deadly stuff is filtered out in a hurry . . . you're in for repair bills and layups!

Here—as under any rugged operating conditions—rely on Purolator Micronic* Oil Filters for a complete filtering job!

Why? Because Purolator's exclusive Micronic* element traps abrasives measured in microns (.000039 of an inch) . . . has a revolutionary accordion-pleated design which provides a filtering area up to 10 times that of old-style oil filters.

For fuel oil filtration, this means the complete job so vital because of close tolerances of injector plungers, and the microscopic size of injector tip orifices. And for lube oil filtration, Purolator's greater efficiency assures less wear on hardworking bearings and other vital parts.

We know that Purolators can solve your filtering problem. Let our engineering staff show you how!

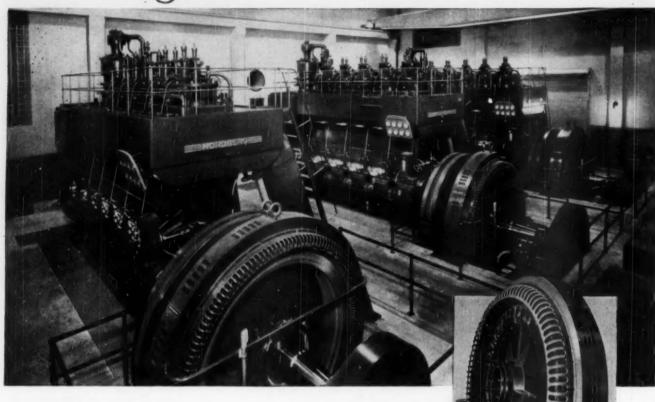
Rahway, New Jersey; and Toronto, Ontario, Canada

PUROLATOR PRODUCTS INC.

Protect your Power with Purolator!



Westinghouse



Tough load problem solved with Westinghouse A-C Generators

A large western cement plant needed generating units to supply its power requirements including a 1000-hp motor. Starting motors this size puts a heavy load on the generators... causes considerable voltage drop. But, voltage drop had to be minimum. Consequently, standard generating units couldn't do the job. The diesel manufacturer—supplier of the complete unit—asked Westinghouse to build special generators to handle the job. The results are pictured above—another successful Westinghouse A-C Generator installation.

This example shows the problem-solving ability Westinghouse offers in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse

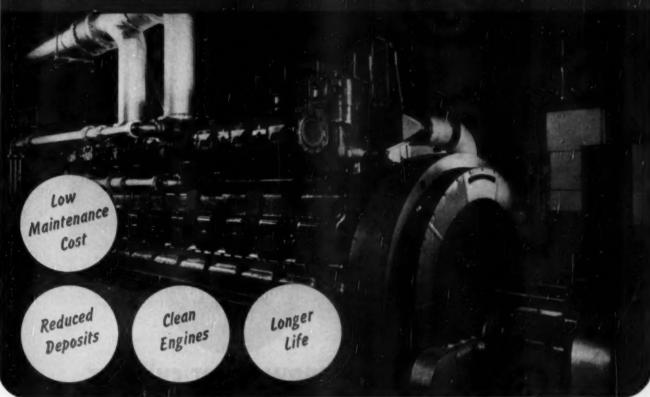
engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans.

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-21572

DIESEL ENGINE DRIVEN AC GENERATORS

DIESELS THRIVE ON SINCLAIR GASCON OILS



A 2,000 hp, 300 rpm Fairbanks-Morse engine in Municipal Light plant, Kennett, Me., operating on Sinclair Gascon Oil HD.

Is yours an "EASY" operation?



Then use Sinclair Gascon Oils, without additives. If your diesels run free from overloads, repeated peak demands, long idling periods, and free from unusually high, low, or fluctuating cooling water temperatures then Sinclair Gascon Oils are recommended.

Sinclair Gascon Oils have low carbon-forming tendencies. Their natural cleansing action keeps engines clean, promoting full power and low maintenance... with economical oil and fuel consumption.

Is yours a "TOUGH" operation?

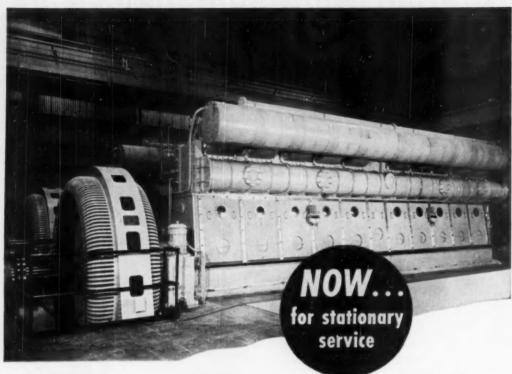


Then use Sinclair Gascon Oils, HD. If your diesels are subject to repeated or continuous overloads, high jacket and crankcase temperatures, idling periods, then Sinclair Gascon Oils HD should be specified.

These are heavy-duty, additive-type oils with greater cleansing and dispersion action, greater resistance to oxidation. They preclude bearing corrosion and are non-foaming. They keep diesel engines clean despite punishing operating conditions and assure oil, fuel, and maintenance economy.

SINCLAIR INDUSTRIAL OILS

For Jubrication counsel, see your nearest Supplier of Sinclair Products or write Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.



38% more horsepower per cylinder

from the Hamilton 211/2" x 271/2"

These are the principal changes that have been incorporated during the last year in the Hamilton 2112" x 2712":

Rotary Exhaust Valves

Rotary exhaust Valves

Rotary valves in the exhaust outlets, which close while intake ports are closing, entrop a larger volume of air, at slightly higher than atmospheric pressure. Total increase in air at full load—available for burning more fuel—is approximately. 40% proximately 40%.

Larger Clearance Volume

Larger Clearance Volume
By enlarging the combustion chamber
and changing the shape of piston and
head, better scavenging results and no
increase in compression pressures even
with the greater volume of air.

Intercooling of Scavenging Air

A scavenging-air cooler is installed be-tween the blower and intake ports. This lowers the temperature of the entire cycle, permits development of more horse-power without increase in temperatures.

Automatic Air Central

Also, an automatic scavenging-air-vo control is provided to reduce flow at par tial loads. This assures quiet, clean, performance and has been a major factor in the good efficiency of this engine at reduced loads.

The Hamilton Series 21-SA diesel, a 2-cycle engine with 211/2-inch bore and 27½-inch stroke, has been redesigned in the last year so that it is now rated for 60-cycle generating sets, at 520 hp per cylinder, 277 rpm. This is the *net* power developed at 100% load the power available at the shaft after allowing for blower

requirements.

This rating represents a 38% increase in horsepower. It has been compression or firing pressures, and achieved with no increase in compression or firing pressures, and practically no increase in temperature. B.m.e.p. is held to the very conservative value of 74.5 lb per sq. in. Speed is well within the limits of good practice. Fuel guarantee is low—and is practically the same for all loads between 50% and 100%—which, we believe, gives this engine the lowest guaranteed fuel rate, for average loads, of any diesel in its horsepower range.

If you are considering a diesel in the 2600-hp range and up, we

would be pleased to give you full information on this engine. Call the Lima-Hamilton sales office in New York or Chicago, or write directly to Lima-Hamilton, Hamilton, Ohio.



PRINCIPAL PRODUCTS: Hamilton diesel and steam engines: Hamilton heavy metal stamping presses; Hamilton-Kruse autometic can-making machinery; Niles heavy machine tools; Special heavy machinery; Reevy iron castings; Weldments, Learnovieves, Cranes and shovels.

We Make Sure Before We Start

Here at Harrison, we have everything it takes to engineer and produce heat transfer units to meet the specific requirements of any Diesel application.

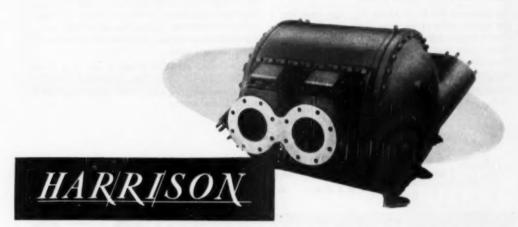
We have design experience, gained by correlating field results with laboratory test data covering both performance and structural strength.

We have sample-making and testing equipment from which we can obtain full basic evaluation of any particular type of heat transfer unit, and determine its ability to meet rigorous field conditions.

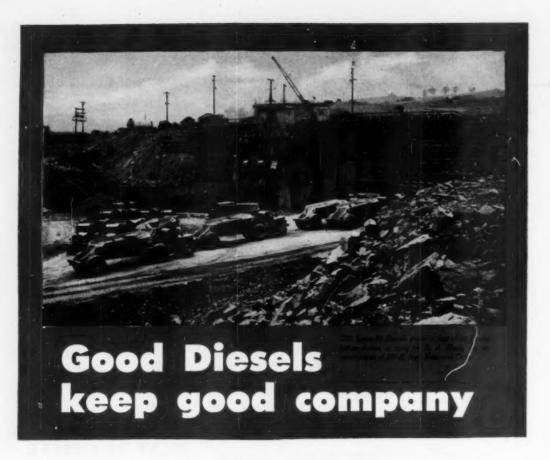
We have ample manufacturing facilities for quality and quantity production at low cost.

We have a well organized service group to aid our customers in obtaining a broad and economical use of our products.

Manufacturers of Diesel engines are invited to avail themselves of our experience and facilities in seeking the solution of their cooling problems. HARRISON HEAT TRANSFER UNITS



HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N.Y.



Today the list of contractors who operate equipment powered by General Motors Series 71 Diesels reads like a "Who's Who" of the industry.

Big operators like S. A. Healy Co., who have the \$25 million contract for New York City Board of Water Supply's half-mile dam across Neversink River Valley, have found what these powerful, efficient Diesels can do.

These modern 2-cycle Diesel engines pack more power in less space—they do their work easily and fast. With power at every downstroke, they deliver high torque that gives them quick get-away and smooth, steady up-grade pull even with a punishing load.

At the same time, these engines are clean in design, easy and economical to service. There's no highpressure fuel tubing. Injector, pump and fuel-metering mechanism for each cylinder are all in single, easily changed units.

Any machine with GM Diesel power is a better machine—sturdy, dependable, economical. So whatever equipment you buy, it will pay you to specify a GM Diesel engine.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 200 M.P. DETROIT 28, MICHIGAN MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK



Dirt-Proof

your Fuel and Lube Oil
With AC Elements



Millions of hours of service stand behind the AC Fuel Oil Elements engineered for factory equipment Diesel fuel filters. For their full life, these precision-built elements actually "Dirt-Proof" the fuel. As protection for fuel injectors and transfer pumps, AC Elements are unequalled.



Standard equipment on G.M.C. Truck and Coach, Flxible Bus, and Detroit Diesel.

AC Elements are also available for nearly every make of lubricating oil filter.

These AC Elements are so efficient that they "Dirt-Proof" your lube oil.

ONLY CLEAN OIL IS SAFE OIL!



AC SPARK PLUS DIVISION . GENERAL MOTORS CORPORATIO



Among all diesels in their horsepower range, Opposed-Piston engines stand alone, with identifying characteristics that assure power output at lower cost . . .

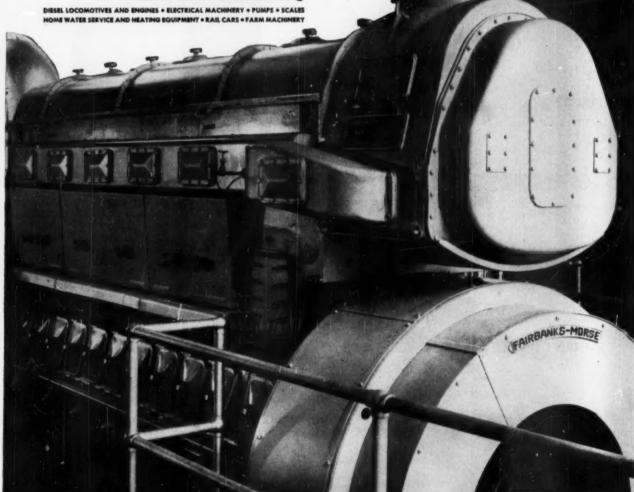
They are of the proved two-cycle design . . . they have lower piston travel speeds to minimize wear . . . they have up to 40% fewer moving parts . . . there are no cylinder heads to absorb heat and reduce efficiency . . . they meet special conditions of torque and speed from zero to 120% load . . . their controlled uniflow scavenging promotes exceptional fuel economy.

All this, in an engine that requires less floor space per horsepower, and is now available for use with natural or sewage gas as well as diesel fuel. Fairbanks, Morse & Co., Chicago 5, Ill.



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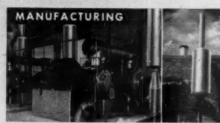
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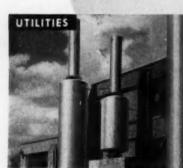
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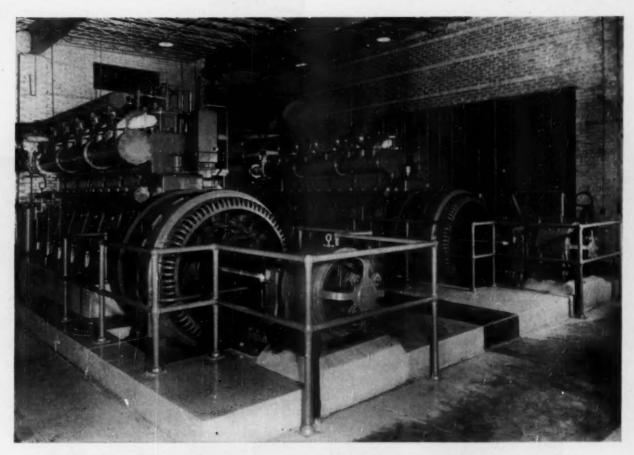
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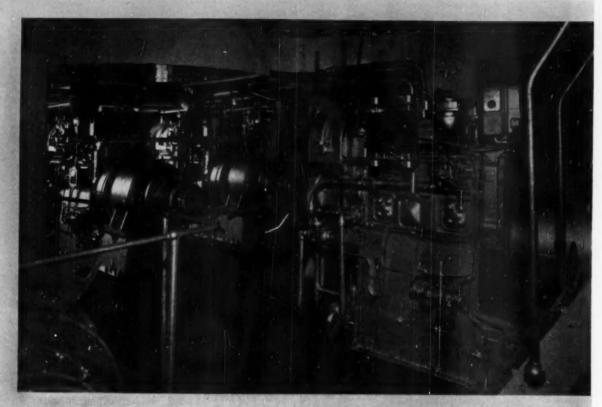
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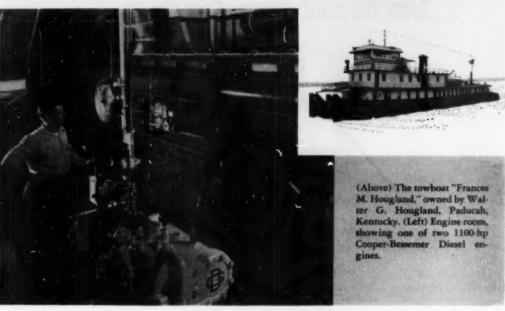
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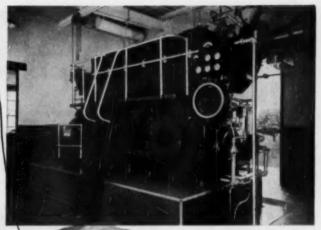
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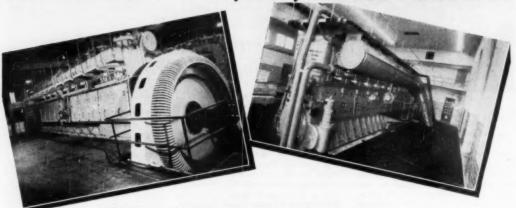




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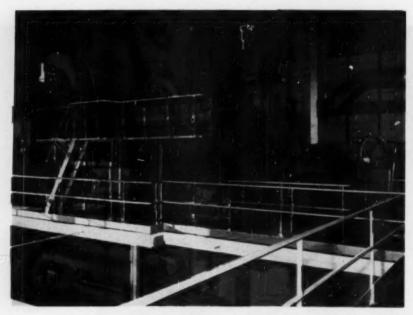












New Cooper-Bessemer V-Design Engine

Arizona Edition's new power plant at Yuma features this 16-cylinder, 3400 h.p. Coaper-Bessemer V-Design Gas Diesel, the first of its type to be put into service. This angine produces double the power of an in-line 8, with practically no increase in size. The plant is also equipped with an 8-cylinder, 1650 h.p. Coaper-Bessemer Gas Diesel. Both engines have a 131-27 bare, 22° stroke and are rated at 327 r.p.m. The plant aperates around the clock, seldom dropping below its rated capacity of 3375 k.w.

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JACKSONVILLE, ILLINOIS

By WM. H. GOTTLIEB

ACKSONVILLE, 11.L., produces 86,000,000 kwh. in ten years; nets \$167,000 as five F-M diesels push production up over 14 kwh. per gal. fuel. Jacksonville is notable for many things. For example, it is the only place in the world to go if you want to buy a brand new Ferris wheel. And if you are interested in making power profits swing high as diesel operating costs swing low, you could not do better than look over the equipment and operating methods at the Jacksonville municipal power plant, where five Fairbanks-Morse diesels have netted \$167,000.00 in ten years.

This is a plant that started earning money for the community even before it was built and has never lost the touch. It seems that the private utility had an application for a rate increase pending before the state regulatory body, but as soon as the city started formal moves to finance its own power plant, the utility withdrew its rate boost proposals and substituted an application for a reduction. But skeptical Jacksonville proceeded with its plans and put its first diesels into service in 1939. These first units were two-cycle, Fairbanks-Morse diesels with built-in scavenging air pumps. Bore was 16-inch, stroke 20-inch, speed of rotation 300 rpm. The fivecylinder engine, rated at 875 hp., went into service on January 15 and the six-cylinder unit, rated at 1050 hp., four days later. A second 1050 hp. diesel started production on February 7. A detailed description of this plant as it was then appeared in the May, 1939, issue of Diesel Progress.

But before turning over an engine, the city filed a rate schedule of 25 percent lower than the prevailing rates, then proceeded to prove that diesels could support the moderate schedules and still show a profit. In the first ten years, the plant generated 86,096,428 kwh. In that period the electric department showed an operating profit of \$538,775.03, of which \$371,003.12 went for debt retirement and depreciation, leaving a net profit of \$167,771.91.

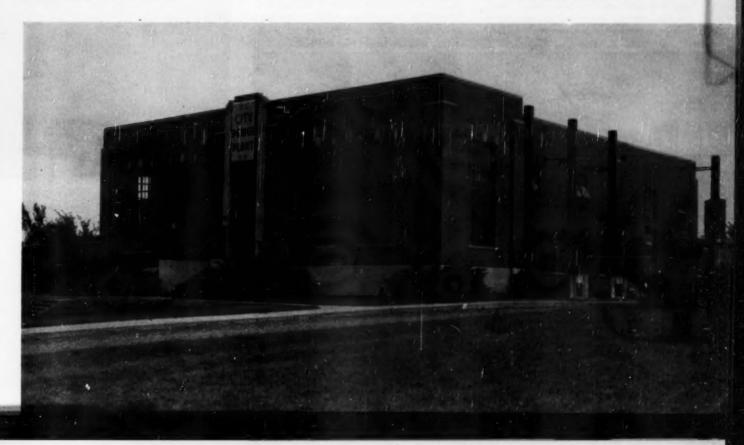
Low rates to the consumer and high profits can have only one explanation: low operating costs. The city's diesels have been highly efficient, with annual production averaging as high as 14.14 kwh. per gal. of fuel consumed.

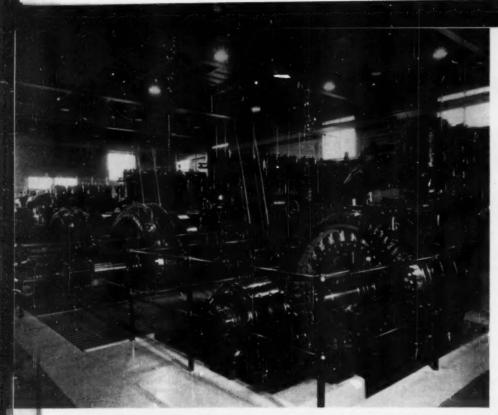
Table I shows how these totals were achieved year by year. Operating costs (such as fuel and labor) went up, but low rates encouraged power consumption and the department's revenues rose to more than a quarter of a million dollars a year. Jacksonville experienced the standard chain reaction, common to most good municipal power systems: efficient diesels—low production cost—low consumer rates—increased consumption—plant improvement and expansion—greater efficiency, and on through the cycle again. Of course, maintenance of a low rate in the face of general price inflation is equivalent to a substantial rate reduction.

First major plant expansion was effected on June 10, 1943, when a 10-cylinder, 16x20-inch, 300 rpm.

Fairbanks-Morse diesel was put on the line. This two-cycle engine with motor driven scavenging air blower was rated at 2,000 hp. Industrial load was high during the war years, but slacked off sharply in the postwar period. This did not mean diminished load for the plant, however, for residential and commercial consumption more than made up the difference. In 1948, the load reached 3,340 kw., dangerously near plant capacity of 3,490 kw. The answer was a second 2,000 hp. F-M diesel which went into regular service on January 15, 1949, raising installed horsepower to 6,975. The latest engine also has a motor-driven scavenging blower. It should be noted that this is a competitive plant fighting for customers with the duplicate system of a private utility company. Neither has a price advantage, for the schedule filed by the city applies equally to the private power company. Consequently, to gain and hold customers, the municipal plant must demonstrate that it can provide equal or superior service, and that it can make a profit year after year sufficient to finance additional municipal services or reduce the consumer's tax load.

Jacksonville engineers have responded to this competitive challenge by developing a well-equipped modern power plant and by operating it with high efficiency. The figures in Table II tell much of the story of this achievement. The kwh. production, which was just 3,393,956 in 1939, reached 14,235,770 in 1949 and pushed into still higher ground in 1950. Fuel consumption has been consistently low





The diesels at Jacksonville, Illinois, have a combined horsepower of 6,975 hp. The first three units were installed in 1939, the fourth unit in 1943 and the fifth unit in 1949.

with production as high as 14.14 kwh. per gal. of fuel for the full years 1946 and 1947. Average for the full period reported was a lofty 13.82 kwh. per gal. We shall discuss later that purposeful program that makes such results possible. Meanwhile, let's translate engine efficiency into operating costs. We could talk about the early years when fuel was a mere four cents a gallon, or even about 1947, when 9-cent fuel still permitted a total generating cost of 8.3 mills per kwh. (This includes fuel, lube, labor, supplies, maintenance, and miscellaneous expenditures.) But let's defy precedent and take a close look at the worst year in the plant's history, the year 1948, when fuel reached 12 cents a gallon.

		Mills
	Total Cost	per kwh.
Fuel	.\$124,472.75	8.74
Lubricating Oil	3,595.99	0.25
Labor	22,531.50	1.58
Suppplies and Misc	2.097.00	0.15
Maint, Eng. Aux	3,692.00	0.26
Maint., Electrical	3,149.00	0.22
Totals	\$159,538.24	11.20

Even in this year of comparatively high costs, the municipal department showed a net operating profit of \$56,576.00, sufficient to make all scheduled

Table I.—Financial Position of Jacksonville, Illinois, Diesel Power Plant

Year	Gross Income	Operating Electric Department	Gross Profit	Debt Retirement & Depreciation Reserve	Net Profit
1939	60,366.34	63,045.35	*2,679.01		*2.679.01
1940	100,490,70	58,666.93	41,823.77	27.129.92	14,693.85
1941	110.443.32	64,745.63	45,697.69	27,520.48	18,177.21
1942	118,924.51	73,864.04	45,060.47	34,189.21	10,871.26
1943	137,608,96	91,494.24	46.114.72	39,574.97	6.539.75
1944	182,560.59	102,755.46	79,805.13	44,164.21	35,640.92
1945	172.949.04	98,106.92	74.842.12	48,982.42	25,859.70
1946	179,260.20	104,173.96	75,086.24	47,916.76	27,169.48
1947	222,837.92	146,389.87	76.448.05	47,018.90	29,429.15
1948	256,465.82	199,889.97	56,575.85	54,506.25	2,069.60
Total	1,541,907.40	1.003.132.37	538,775.03	571,003.12	167,771.91

·Loss.

allowances for debt retirement and depreciation and still show a small profit. Happily, the worst is passed and the current year will show substantially lower costs and much higher profits. Fuel currently is below the 1947 level of nine cents. Other cost items are fairly constant while production and income are rising. Profits should approach the highest levels of recent years. The plant has been equally successful in providing the other essential-dependable service. The plant's total enforced down-time for any reason in more than 10 years is less than 15 minutes. There has been no enforced shutdown in the past four years. This is particularly impressive in view of the heavy operating schedule necessitated by rapidly rising load in recent years. Thus, the first 2,000 hp. diesel ran 7,825 hours out of a possible 8,760 in 1947 and went on to operate 7,935 hours in 1948.

Jacksonville gets performance of this order by careful operation of its heavy-duty prime movers. En-

This 2,000 hp. F-M diesel, the latest to be installed, is a 10-cylinder, 16x20-inch, 300 rpm., 2-cycle unit with motor-driven scavenging air blower.



gines on the line match load closely, with the operating engine load factor over 75 per cent all the time. Maintenance procedure has been personalized with each operator assigned to watch over a specific engine. He takes an indicator card at least once a week and records the results on the log sheets for the information of Chief Engineer Henry Cruse. If an engine doesn't sound quite right, a card is taken immediately. Governor settings also are recorded on the log sheet and have proven a useful clue to trouble. Every 10,000 hours, an engine is given a thorough inspection. Pistons are

pulled, main bearings rolled out. Accurate records are kept of condition and measurements of each engine part. It has been found that maximum cylinder wear has been only .020-inch in 40,000 hours of operation. Bearings show virtually no wear. The angle-cut, plain graphitic rings are always free and in good condition.

Another feature of the plant's trouble-free operating program is the use of good accessory equipment to protect the prime movers. A closed cooling water system includes a shell-and-tube heat exchanger for each engine and two cooling towers, one 8,000 hp. induced draft tower and one 4,000 hp. atmospheric tower. Both have divided bases to provide maximum operating flexibility. This is more cooling capacity than the plant needs, but provision was made for further expansion. The same line of thought is evident in the water pumps. For circulation of jacket water through engines and exchangers, there are three 4-inch centrifugals driven by $7\frac{1}{2}$ hp. motors and four 6-inch centrifugals driven by 15 hp. motors. Raw water is put



through the exchangers and towers by three 4-inch and two 8-inch motor-driven centrifugal pumps. Make-up water for the jacket system is put through a zeolite softener. Chemicals are added to the raw water though it comes from the city supply and has a maximum hardness of only six grains.

Water temperature is controlled by a hand-operated butterfly valve in the raw water line at each oil cooler and heat exchanger. Jacket water is circulated through radiators to heat the plant and provision is made to send it through coils in the

Table II.—Operating Records of Jacksonville, Illinois, Diesel Generating Plant

Year	Kw. Hr. Generated	Gallons Fuel Consumed	Kw. Hr. per Gallon Fuel	Gallons Lube Consumed	Peak Load Kw.
1944	10,414,150	778,373	13.37	5,330	2,160
1945	10,052,050	739,149	13.59	4,925	2,050
1946	10,157,750	718,339	14.14	4,151	2,650
1947	13,044,790	922,324	14.14	5,351	2,960
1948	14.235,770	1,033,936	13.77	6,911	3,340
JanJune					
1949	7,614,570	546,448	13.93	3,702	******
Totals	65,519,080	4.738,569	13.82	30,370	3,340

fuel storage tanks if it becomes necessary. The No. 2 fuel oil is delivered by truck and unloaded into three 20,000-gal. vertical cylindrical tanks by a motor-driven rotary pump. From storage fuel flows by gravity to the engines through meters, strainers, bag-type filters, and small float-operated regulator tanks which eliminate the need for day tanks. An S.A.E. 30 detergent oil is used to lubricate all the engines and the original oil is still in service. Rather than drain crankcases and discard oil, Jacksonville engineers believe in keeping the lube in good condition at all times. Consequently, each engine is provided with a cellulose-type purifier for continuous by-pass operation in addition to filters on the engines. Oil temperature is controlled by means of a lube cooler for each diesel. Also each engine is provided with a motor-driven pump to bring oil pressure up before starting and continue circulation of lubricants when shutting down. Lube oil is delivered in drums and stored in two tanks. from which it is pumped to the diesels as needed. Scavenging air for each diesel is drawn through a vertical intake silencer outside the plant into a

filter chamber and then to the air pump or blower. Four of the filters are of the automatic self-cleaning type; the fifth is an oil bath filter. Exhaust gases vent through vertical silencers outside the building. Scavenging blowers on the big engines are 11,000 cfm. rotaries driven at 600 rpm. by 125 hp. motors hooked directly to the station bus bar. The plant has the protection of an alarm system which warns of improper jacket water pressure or temperature, raw water pressure, and lube pressure or temperature. There is a multi-point exhaust pyrometer for each engine. The modern dead-front switchboard, set flush with the wall, has five generator panels, one spare, eight feeder panels, two front panels, two regulator panels holding rocking contact type voltage regulators, and a swinging synchronizer panel. The board equipment includes recording wattmeter, voltmeter and cycle meter, as well as a power factor meter on each engine panel. permitting easy balancing of the units. The plant has a double bus and can operate on either one, which makes for safety and convenience in electrical maintenance and repair.

The two 2,000 hp. diesels at Jacksonville, Illinois, are arranged like marine units with opposite rotation and control sides facing the aide between.



cycle, 300 rpm., 2400/4160 V generators now operated at 2400 volts.

Governors: Woodward Governor Co.

Piston Rings: C. Lee Cook Mfg. Co.

Fuel Oil: Pana Refining Co. No. 2 oil.

Fuel Filters: Wm. W. Nugent & Co.

Fuel Oil Pumps: Fairbanks, Morse & Co.

Fuel Regulators: Struve.

Fuel Meters: Neptune Meter Co.

Lube Oil: Standard Oil Co. of Indiana.

Lube Oil Filters: Purolator Products. Inc.

Lube Oil Purifiers: Honan-Crane Corp. with Winslow cellulose elements.

Lube Oil Pumps: Fairbanks, Morse & Co.

Oil Coolers: Schutte & Koerting and Ross Heater & Mfg. Co., Inc.

Raw Water Pumps: Three 4-inch, 71/2 hp., and two 8-inch, 30 hp. Fairbanks-Morse pumps.

four 6-inch, 15 hp. Fairbanks-Morse pumps.

Generators: Fairbanks, Morse & Co., 3-phase, 60. Cooling Tower: J. F. Pritchard & Co. and The Marley Co.

Raw Water Treatment: Dearborn Chemical Co.

Water Valves: R. S. Products.

Air Compressors: Gardner Denver Co.

Intake Air Filters: American Air Filter Co., and Vortox Co.

Intake Silencers: Maxim Silencer Co. and Burgess-Manning Co.

Blowers: Roots-Connersville Blower Corp.

Exhaust Silencers: Maxim Silencer Co. and Burgess-Manning Co. .

Alarm System: Marquette Electric with Penn Electric Co. equipment.

Switchboard: Westinghouse Electric & Mfg. Co.

Pyrometers: Illinois Testing Laboratories Inc.

Voltage Regulators: Allis-Chalmers Mfg. Co.

Indicators: Bacharach Industrial Instrument Co.

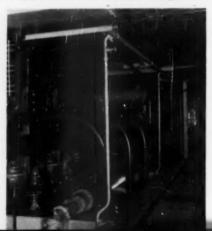
All five diesels are direct-connected to 3-phase, 60cycle, 2400/4160 volt alternators, now operating at 2400 volts. Exciters are also direct-driven. Warren and Van Praag, of Decatur, Illinois, were the consulting engineers on the Jacksonville plant on the first four engines, and Casler and Stapleton, of Jacksonville, engineered the fifth engine. The plant is operated under the supervision of George Coldewey, Superintendent of the Light and Water Departments, by Chief Engineer Cruze, an assistant, four operators, and a maintenance man. Operators work a five-day, 40-hour week with rotating schedules and paid vacations. Major policy matters are determined by Mayor Ernest Hoagland and the Board of Aldermen, with primary responsibility in the hands of the board's Light committee under the chairmanship of T. D. Chumley. Mr. Hoagland was an alderman when the plant was constructed and has been Mayor since 1940. Mr. Chumley has headed the Light committee for life of the plant.

Let us summarize briefly the contributions of this municipal power plant to the City of Jacksonville. First, it has given virtually flawless service to its power customers. Second, it has provided a 25 per cent rate reduction not merely for its own customers but for those served by the private utility. Based on consumption in the last 10 years, this amounts to a saving of more than \$900,000.00. Third, it has earned the city a net profit of \$167,771.91. Finally, it has given the city a large, modern, efficient power station, financed out of earnings, which promises continued service and greater profits.

The exhaust sileneers at Jacksonville, Illinois, are located on the right side of the plant. The air in-take sileneer and air filters are installed on the opposite side.



Jacket water pumps and raw water pumps are in the basement as are the heat exchangers.



The Westinghouse switchboard contains among other instruments rocking contact-type voltage regulators; recording wattmeters, voltmeters, and cycle meters; Ward Leonard remote control chain and sprocket operated rheostats plus Alnor pyrometers.



DIESELS SERVE TERHEL FARMS

Terrill Sartain Stages Comeback Via Most Powerful Tractors in Post-War Period in Farming 15,000 Acres In Rice, Grain and Pheasants After River Broke Him.

By F. HAL HIGGINS

TERRILL SARTAIN is turning the tables on a river that whipped him in 1937 when its levee break drowned his farm and broke him flat. The old Sacramento Valley for a century has been the setting for the biggest farming achievements the world has ever seen. In fact, the rest of the world frequently dismissed the stories of its biggest and damnedest doings as just more California-size lies. The facts of farming out here where the combine has been used for over 90 years, where "mule trains" of 30 to 40 head of animals were handled by one driver on a harvesting machine, and where the great outdoor sport of the '70's and '80's was the setting up of a new worlds record for a day's threshing with big crews using the biggest and best threshing machines they could build-well, those tales were just too fantastic when told in letter or by returning travellers to the outer world to be taken as anything but super-Munchausen tales of the Paul Bunyan pattern.

But back to the modern hero of a hundred years of farmer battles against natures elements-drought, floods, north winds, wild geese, weeds, etc. Terrill Sartain is the third generation of Sartains who have farmed the Sacramento Valley for sixty years and bet their time, brawn and brains against the elements plus the human hazards of markets, transportation, rising labor costs and loans at high interest rates that caved in on the farmer when "acts of God" caught him out on a limb without enough crop to pay the interest. But all through those ups and downs of weather and depressions. the Sartains were learning how to harness the elements and make nature work for instead of against their farming system. It was a "mule train" system of farming before the tractor appeared, with acres of horses and mules powering the agriculture of the Sacramento Valley from the earliest break-



ing of ground for wheat soon after the Civil War to about World War I, when the crawler tractor began appearing in volume to unhitch the bighitch unwieldly teams from combines, plows, seeders and scrapers. Those first tractors had plenty of bugs, but they were more efficient than the "bindle stiff" farm labor of the horse days with the droves of animals that required a large share of the crop to feed them.

"I've been farming here off and on since 1926," said the third California generation Sartain as he leaned back in his ranch office as the International Harvester dealer in Sacramento delivered a big 24-yard LeTourneau scraper to team with his new International TD24 diesel tractor delivered a few days earlier by Claude Henderson, IH dealer . . Colusa County. "I've been growing rice since 1933 except in 1938 following the disastrous flood of 1937 that broke the levee and flooded my lands while busting me. I am just launching a program of land development on about 15,000 acres of my own and neighboring lands to make it proof against floods and yet irrigable for rice, sugar beets and other crops. This land program covers levee building, drain cutting, levelling, check building, etc. This farm is as near dieselized as is practical at the moment, a few old gas tractors still being on the ranch. This is the way my ranch power lines up today: one TD24 International diesel; six TD18's International diesels; two TD9 International diesels: one Farmall: two Cat 30's. gasoline; three Cat 60's, gasoline; one Cat 65 converted diesel; two Marvin landplanes; one custom built checker; three 21-foot Goble disks; two sets Deere disk plows (5-gang); two LeTourneau 10vard scrapers: one Wooldridge 12-vard scraper: one Bucyrus-Erie 15-yard scraper; one Garwood 12yard scraper (all pulled by diesel tractors); five combines-one rebuilt Harris on D6 tracks, one John Deere 36 on rubber, one California special with Chrysler engine on Cat tracks, two Massey-Harris self-propelled on tracks; two swathers; nine trucks-eight Fords, one International."

"This TD24 International will power our big land development program. In this swing to diesels, we have gone to the International Harvester's crawler line, you will note. They have proved economical, easy to operate and service, and we get fine dealer service at the lifting of the telephone receiver. Here is about the way our crops on Terhel Farms, Inc., line up: 2,200 acres of rice; 5,300 acres of wheat and barley; 4,000 acres of summer fallow; 3,000 acres leased to other parties for rice, beans, sugar

Mother earth gets a big fast shave on the Terhel Farms in Colusa County, where this International TD24 was recently bought to develop a big tract of the 15,000 acres in the farm for irrigated farming without the hazard of floods from the Sacramento River.





Terhel Farms "Gets a Shave" by an International TD24 diesel tractor pulling a 24-yard scraper, as it levels a 500-acre piece of land for irrigated farming in Colusa County, California.

beets and peas. I plan to stick with rice, as it has worked out great in my farming system. I alternate rice with peas and barley. Beans and sugar beets will be given more attention, especially the fatter."

One of the exotic touches to the Sartain rice farming system is the Hindu irrigator, who gets well paid to utilize his native talents to tell when water should be turned on and off the rice fields. The turbaned Oriental walks along the levees, raises his head for a sniff at the atmosphere hanging over the rice fields, and inakes his decisions that control water handling on the irrigated rice. "It pays off," says Sartain. Terrill Sartain is a veteran flying farmer, picking up the use of a plane for his farming operations as naturally as he has done with a diesel tractor and airplane weeding of crops by chemical sprays. The first time the writer met the chunky flying farmer he was landing his little plane at the edge of his rice field at Colusa County four years ago after a daily herding of wild ducks to keep them off his rice crop until it was harvested. Herding wild ducks and geese in the Sacramento Valley is a tradition that has been handed down from the earliest wheat farmers, who had to work crews of geese herders in night and day shifts to keep the clouds of wild game from settling in and destroying their grain fields before harvest. The fabulous "Doc" Glenn, for whom Glenn County was named, spent \$30,000 a season on this phase

of his crop, men riding on horses with short shot guns that were fired aimlessly into the clouds of geese hovering over the ripening wheat fields. Now this job is done by plane by either the owner or hired fliers from the many airports that dot the Sacramento Valley to serve the rice, grain, tomato and other crops that are seeded, sprayed or dusted by plane to speed up work and cut costs.

"The spraying of 2.4-D by plane on my rice and grain crops added about \$60,000 to the income from those crops last year, I figure," explained Sartain, "based on an added 20 per cent to the yield over unsprayed acreage." Hence airplane weeding of grain and rice fields is here to stay in spite of all the controversy in some areas where inexperienced fliers applied dust instead of spray and hurt neighboring crops of cotton, beans, tomatoes, etc., where the material drifted in the breezes. I hire a custom operator, 'Slim' Davis, who put on the Dupont 2.4-D as sold and serviced by the Colusa dealer. 'Pete' Sawyer, of the Sacramento River Warehouse Co." The fast comeback of Terrill Sartain via diesel power from below zero to a 15,000-acre ranch he and his wife Helen have named Terhel Farms, Inc., is one of the current high points of Sacramento Valley post-war agriculture. The Sartains enjoy life while working hard with both head and diesels to develop a farm that will be bigger than the hazards of the past



Terhel Farms starts a big land development program to make the farms safe from the old Sacramento River.

that made farming such a gamble from pioneer days to recent times. Their interest in developing the game side of the farm to give sportsmen pheasan shooting is their idea of unselfishness with their hard won farm and its wild life. Already, in the first year of operation, their Terhel Farms has leaped into leadership in furnishing more people a chance to shoot this kind of game for their combined sport and tables. That Terrill Sartain is not a mere wishful dreamer on the game side of his ranch activities is seen in the recently released figures on pheasants shot by some 40,625 hunters who went after this tasty game dish the past season. Acting Chief Ben Glading, of the Bureau of Game Conservation for the State of California, released these figures:

Area	Hunters	Pheasants Taken
Staten Island	5,707	1,495
Williams	3,742	1,194
Sutter Basin	6,557	2,138
Notomas	10,765	2,008
Grimes	9,314	3.281
Sartain	4,440	2,013
Totals	40,625	12.129

"The Sartain area was the only one on which a fee to shoot was charged and its count includes figures for some free shooting ground." Said the

official of this first season's pheasant shooting under the new law: "There is nothing to say but it was a most happy experiment. We can improve the setup and the functioning of our department, but there is no denying the area idea meets the needs of the landowners and shooters. It is regrettable the season itself was not as good as 1948, but that is something over which we had no control. We have been questioning the landowners who were good enough to permit us to create the areas. There are 54 of them, as only two areas-Staten Island and Sartain-are owned by individuals. All say they are willing to return their land to area use next year, which shows well the experiment worked during the first try. There is no doubt about being able to obtain more ground for the 1950 season under such encouraging conditions. Naturally, we are going to improve things over the past season for those who were kind enough to lend us their land to help hunting and hunters."

Terhel Farms does a great ranch service job, having portable service station loaded with diesel fuels; all grades of oil needed for tractors, combines and trucks; welding and cutting tools and equipment, ect. This portable station is built on an Army half-track and can go anywhere in rice or other fields regardless of weather. Skilled labor only is hired, as a skilled operator who knows his diesels and how to operate them efficiently at farm work is worth his pay. In fact, the diesel tractor has done more to lift the farm hand of the Sacramento Valley from the old bindle stiff, who was a floating bum wandering the countryside between harvests, to the year-round skilled operator with family, home and auto. The cumulative effect of diesel farm tractors in the Sacramento agriculture has begun to pay off big to farmers, farm labor, dealers, consumers, and small business. The Sartains-Terrill and Helenrepresent the big swing in a dramatic way.



THE CLIMATE OF CALIFORNIA ON A RAMPAGE, 1078-INCIDENTS OF THE GREAT FLOOD IN THE SACRAMEN VALLEY, REFUGEES SEEKING PLACES OF SAFETY FROM THE DESOLATING WATERS

Charles Nahl's dramasic challecterization of the tragic relogees, his residering of the raging sky, his delineation of the last struggles of the cattle, make a genre officeration that reaches a peak of morit among engravings of California.



DIESEL SHIP JOHN N. COBB

By CHARLES F. A. MANN

USHED to completion for the 1950 season in Alaska water, the trim new Fish and Wild Life Research vessel, John N. Cobb, was delivered by her builders, Western Boatbuilding Co. of Tacoma, on February 13th. The vessel is designed to do a wide range of Bureau of Fisheries type of research and field studies in an extended range of territory in Alaska and provides every modern scientific facility and comfort for the crew, which includes two to four scientists assigned by the Fish and Wild Life Service. Technically, it is called a Fisheries Exploration Vessel, for United States Department of the Interior.

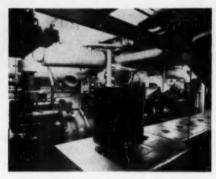
John N. Cobb was designed by George Nickum, of W. C. Nickum Sons, of Seattle, and is an extra heavily built fir job having overall dimensions of 93 feet 51/4 inches by 24 feet 6 inches moulded beam by 12 feet 7 inches moulded depth and 8 feet 6 inches mean loaded draft. She has three steel watertight bulkheads and appropriate doors, to avoid sinking in case of collision. Below, forward, is space in three compartments for a crew of six and a chief engineer's room, followed by the large engine room amidships, a roomy cargo hold and a quick freeze unit for specimens and a brine tank for live specimens. The vessel is equipped to seine-trawl, drag-throw or live bait fish for all types of specimens likely to be found. A unique hydraulic driven troll winch gear is fitted on the main deck beside the bait tank shelter, operated by a Vickers hydraulic pump in the engine room. The Vickers pump operates the Rowe seine winch, as well as the Rowe anchor winch.

On the main deck are staterooms for two scientists each, a total of four, together with work spaces, desks, lockers, etc., toilet facilities and large galley, messroom, modernly equipped with electric refrigeration, tile sinks and oil burning stove. The captain's and radio operator's room and pilot house-chart-tadio room are all in the house atop the main deck level.

The main engine consists of a heavy duty Fairbanks-Morse two-cycle, en-bloc diesel, having eight cylinders and developing 325 hp. at 350 rpm. A Timken roller thrust bearing is fitted, lubricated from the main engine. A 60 x 44 Coolidge threebladed bronze wheel is fitted, as well as a Twin Disc sailing clutch. Ross Heat exchanger and an American heating boiler are fitted. Auxiliary power is supplied by two General Motors diesels, driving 30 kw. Electric Machinery 220 volt a.c. generators. One is also equipped with a Twin Disc torque converter. Square D switchboard units control the electric circuits.

Elaborate navigation equipment is carried throughout, including a Sperry Loran and Sperry Radar, as well as Sperry Gyroscope-electric steering system, either full automatic, manual or electric-hand. Full pilot house control of the main engine is provided, as well as a complete ship's intercom, including the crow's nest. Applied Electronics supplied the direction finder. Tank space is provided for 11,000 gallons of fuel oil, 750 gallons of lube oil and 5,000 gallons of fresh water. On deck a lifeboat on Wellin Davits and an 18-foot Western Boat Fairliner, the Western Boatbuilding Co.'s famed line of pleasure and auxiliary craft, is carried for working near shore. Burgess snubbers are provided in the stack. A world range Northern Electric Co. radio is also carried.

And so, another fugitive from the federal budget escaped to the high seas before the economy axe could stop its construction!

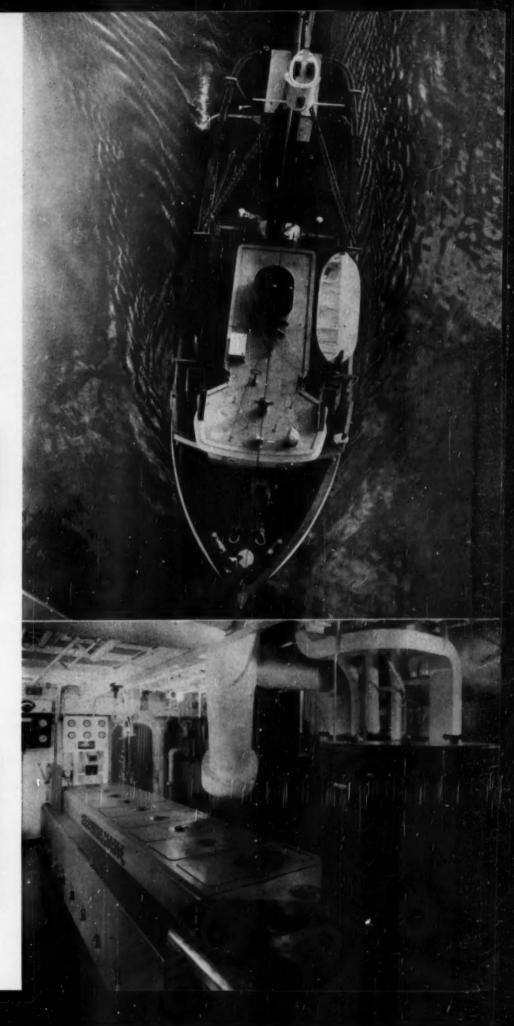


Interior of the engine room of John N. Cobb showing the top of the Fairbanks-Morse main engine and the two General Motors auxiliary generating sets in the background.





APRIL 1950



MASSEY-HARRIS DIESEL TRACTOR

Century Old Full-Line Canadian Farm Machinery Manufacturer with U.S., English and Australian Roots and Factories Blankets Agricultural World with New Powered Wheel Jobs

By F. HAL HIGGINS

ASSEY-HARRIS is the new name on diesel tractors that is blazing a sales path around the farming globe. This century old Canadian full line farm machinery firm with deep roots in the soils of the U.S. via the famous old Case Plow Works of Racine, as well as in the Sunshine works of Australia and another factory in England has in the past decade of war and post-war lifted its head alongside the two top manufacturers by daring research and sound interpretation of the farmer's demands for better farm equipment to cut costs and increase quality of farm food and fiber. Its leadership in introducing the one-man self-propelled combined harvester as a war weapon to save man power had the cooperation of the U.S. Government in allocating steel for mass production of their machine when rivals were held down by materials shortages.

The writer can recall vividly the Massey-Harris men and farm machines in Canada's raw west just before World War I, and again in the Illinois soy bean harvest right after World War I. The alert M-H enginers, blockmen, branch managers and dealers were alive to the needs and doings of their farmers. Hence, there was no hesitation on their part in daring to try their combine in soy beans to help corn belt farmers harvest a new crop economically. Today, soy beans have spread all over the corn belt as a crop that adds hundreds of millions of dollars to the farmer's income while helping him turn out better meat while building up his farm soil. Everybody in the corn belt raises soy beans now where no one raised them thirty years ago, practically speaking. And the combine is the standard harvest machine when the crop is not harvested by live stock. Massey-Harris broke this field open for the combine and enabled the farmer to quickly fit it into his rotations and raise his income and living standards.

Two years ago, the writer happened to be down at Phoenix, Arizona, where temperatures soar and

water is more precious than tourists in recent years. As we drove out north of the Arizona capital city a few miles, we passed a machine shop. "That's headquarters for the Massey-Harris crew that is giving their diesel tractors their field trials," said the local Standard Oil of California official with whom we were riding. "That so? How long have they been testing their diesels here. what engines are they using? How many sizes are they testing? Where are they working today? Let's drive over and watch the tractors at work." All these questions were asked in rapid succession. As a result, we drove on a few mlies and caught two of the M-H diesels at work on heavy plowing. And it was real dirt moving, this plowing of heavy, bone dry land to a depth that looked like the limit to which the plows could be set. But the two M-H tractors moved along with never a falter. one behind the other, round and round the field.

These engines, which were returned to the factory after certain intervals of work, were Continentals, said the driver. The company had already been working to develop a diesel tractor for several years, and had the British Perkins, Meadows and others to study and test in the European areas. In fact, the British Massey-Harris factories have been offering a diesel tractor for some years before this U.S. line was announced recently.

Following 's a partial report of Official Tractor Test No. 426, held by the Agricultural Engineering Dept. of the University of Nebraska, Lincoln, Sept. 28 to Oct. 1, 1949.

Name and Model of Tractor: Massey-Harris 44 diesel standard. Manufacturer: The Massey-Harris Co., Racine, Wisconsin.

Fuel Oil and Time: Fuel, commercial diesel fuel; cetane, 47 (Cetane rating taken from oil company's typical inspection data); weight per gallon, 6.998 pounds.



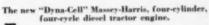
Oil: SAE No. 10-10W. To engine, 2.731 gallons; drained from engine, 1.555 gallons. Total time engine was operated, 35 hours.

Chassis: Type, standard; drive, enclosed gear. Tread width: Rear, 54 inches; front, 49 inches. Wheelbase, 80 inches. Advertised speeds, miles per hour: First, 2.21; second, 3.33; third, 4.43; fourth, 5.75; fifth, 12.28; reverse, 2.89. Belt pulley: Diameter 13.5 inches; face, 6.5 inches; rpm., 863; belt speed, 3,050 fpm. Clutch: Borg & Beck, dry disk; operated by foot pedal. Seat: Monroe. Hydraulic lift control: None available. Brakes: Own, internal expanding band; location, differential shaft; gear reduction (brake drum to rear wheel), 5.077; operated by two foot pedals; locked by latches; equalization, none.

Engine: Make, own; type, four-cylinder vertical. Head, I; mounting, crankshaft lengthwise; lubrication, pressure. Bore and stroke, 3%x5½ inches; rated rpm., 1,350; compression ratio, 15. Port diameter valves: Inlet, 1-5/16 inches; exhaust, 1-5/16 inches. Fuel injection system: Bosch. Batteries: Two 6-volt batteries. Fuel filter: Zenith and Bosch (one each); permanent brass disks and replaceable filter, respectively. Generator and starter: Auto-Lite, 12-volt. Governor: Bosch; type, centrifugal, variable speed. Air cleaner: Donaldson, oil washed wire screen. Oil filter:



The large Massey-Harris 55-D is a four or five plow job.





Purolator; type, replaceable paper element. Cooling medium temperature control: Thermostat.

Says Jim Dalton of his company's new diesel engine: "The heart of our diesel tractor is this sturdy, four-cylinder vertical, four-cycle, overhead valve type motor, fitted with removable sleeves. Cylinder block and crankcase are cast integral. Pistons are heavy-duty anodized aluminum. Crankshaft is mounted on precision-type steel-backed bearings. Lubrication is by full pressure through drilled passages in the cylinder block and crankcase to all main and connected rod bearings. Cooling system is automatically controlled by thermostat so that the flow of water is governed to provide uniform cooling throughout."

"The introduction of this new Massey-Harris feature in diesel motor design brings new advantages in diesel tractor field performance. It is the new exclusive Dyna-Cell which softens the old, annoying, power-wasting diesel 'knock,' permits lower pressure combustion and develops greater power with less engine weight. The new, exclusive Dyna-Cell is the latest advance in diesel motor design. By the use of this principle, fuel and air are distributed more uniformly than ever before into the main combustion chamber, thereby prolonging combustion and providing cushioned, positive power throughout the cylinder stroke-smooth, steady power that gets you through the tough spots under finger tip control-makes use of all the power in the fuel."

The Massey-Harris 55 is the big job, explains Mr. Dalton in an interview with the writer at the annual Christmas party of the California Tractor & Implement Club. It is a four- to five-plow tractor, depending on soil and terrain, of course, and comes only as a standard wheel tractor while the 44 comes both as row crop and standard tractors. Vice-President and Western Factory Manager Lloyd Myers is tremendously enthusiastic about the place the M-H diesels are immediately making for themselves in western agriculture and industry. The west has been diesel-minded from the earliest days of diesels, when they were seen only on stationary bases for pumping and in ocean going boats. This definitely puts the M-H colors into the big time western tractor picture as well as rockets the appeal of the line to the export fields where the Massey-Harris combines are already well known. Those who have watched the M-H engineers in the grain and rice fields of California, Arizona, Texas and Canada predict their diesel engines will be powering other things than their tractors before long. It is a dream of some engineers to market an engine that can be used the year round by the farmer as he does one crop job after the other. In other words, he would buy a set of farm machines such as four-row corn planter, two- or four-row corn picker, big cut mower, wide side delivery hay rake, four-row cultivator, field and general sprayer, and have all powered by the same dierel engine as it was switched from one machine to the next through the season to power a set of self-propelled one-man machines. M-H already has led the way in selfpropelled combines and corn pickers. They hint other revolutions are coming.

FRENCH LIGHTHOUSE TENDERS

BY GEORGE D. CROSSLEY

TIRMS and individuals from virtually every part of the eastern hemisphere had a guiding hand in building the fleet of four lighthouse tenders for the French Ministry of Public Works. All are to be heartily congratulated for their fine spirit of team play that so successfully coordinated the numerous and obviously difficult problems in a project of this kind. Basic plans for the French lighthouse tenders were initially supplied by the United States Coast Guard and revised by George G. Sharp, Inc., to comply with the requirements of the French service. The construction of the vessels was handled by Yarrows, Ltd., ship builders and engineers, Victoria, British Columbia. Dieselelectric propulsion machinery was furnished by the Cooper-Bessemer Corporation and the Westinghouse International Company. Supplementary equipment was furnished by well known manufacturing firms in Canada, United States, England.

Scotland and France. To top this, the vessels were delivered to their home ports in Brest, Dakar and Tunis by English crews supplied by the firm of Pedder and Mylchreest, of London.

The vessels, Finistere, Leon Bourdelles, Augustin, Fresnel II and Quinette de Rochemont II, are primarily duplicates of the United States Coast Guard cutter Juniper. Built at the Mathis Yard in Camden, New Jersey, in 1939, from Coast Guard plans and specifications, the twin-screw diesel-electric Juniper was notable as one of the early diesel propelled vessels to employ pilothouse control with variable engine speed. With this system, the speed of each propulsion diesel-generator set is established as a function of its motor speed and load to provide optimum performance at all points above idling speed in the free-running condition. The 177-foot Juniper was the forerunner of some

forty 180-foot single screw Cooper-Bessemer-Westinghouse powered diesel-electric cutters placed in service by the Coast Guard during the war years. These cutters now form the backbone of the Coast Guard fleet for tending aids to navigation. It is important to note, however, that the control system of the 180-foot single screw Coast Guard vessels was refined to provide torque control, eliminating all chance of underloading or overloading while engaged in such service as towing or ice breaking, as well as under free-running conditions. This same design feature was incorporated in the propulsion control equipment for the French lighthouse tenders. George G. Sharp, Inc., in addition to revising the complete plans and specifications of the Juniper as provided by the Coast Guard, also acted as coordinator for the owner in the preparation of final plans, and in the construction, supervision and acceptance of the vessels. Inspection and classification were performed by the Bureau of Veritas, Canadian Branch. Machinery produced in the United States was inspected by the Bureau of Veritas, American Branch, all in accordance with the rules and regulations of the American Bureau of Shipping.

The vessel design is of the single continuous deck motors,



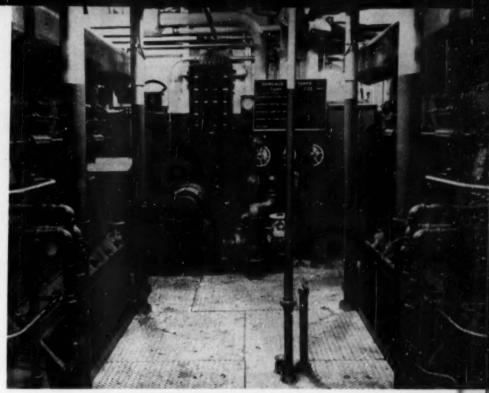
fore end of the upper deck. An accommodation flat extends aft of the engine room, part of which is watertight, forming a trimming tank with the shell. Eight transverse watertight bulkheads between shell and main deck divide the ship into nine compartments. Forward and after bulkheads have hinging watertight doors. The vessels are provided with twin screw diesel-electric propulsion. Each propeller is driven by a Westinghouse d.c. electric propulsion motor rated 440 hp., 250 volt d.c., at 195 rpm. Each propulsion motor has a shaft bearing forward and aft. The forward bearing is of Kingsbury thrust design. The power for operating the propulsion motors is derived from two Cooper-Bessemer, Model GS-6 diesel engines. These diesel engines are four-cycle, solid injection, atmospheric type, arranged for battery starting. Each Cooper-Bessemer engine has six cylinders, 101/2-inch bore with 131/2-inch stroke rated 550 bhp. at 730 rpm. and directly connected to a 355 kw. generator and a 40 kw. exciter. Under normal operation, the propulsion motors are controlled from the pilot house. In an emergency these motors may be controlled from the generator room at switchboard level through the use of a port and starboard engine room telegraph.

The main propulsion engines are equipped with latest designed accessory equipment such as a closed cooling water system with Ross shell, tube type heat exchangers incorporating Fulton Sylphon temperature controls, Briggs fuel and lubricating oil clarifiers, and a Bristol exhaust temperature pyrometer. Each engine-generator set is mounted on a steel subbase attached in turn to the ship's foundation by Korfund vibroisolators. A Barvic visual and audible alarm panel provides instant warning of any variation in the temperature or pressure of engine lubricating oil or cooling water. The engine room is fully equipped with all necessary auxiliary equipment, including tanks, pumps, strainers and standbys, as required by the Bureau of Veritas.

SHIPS PARTICULARS

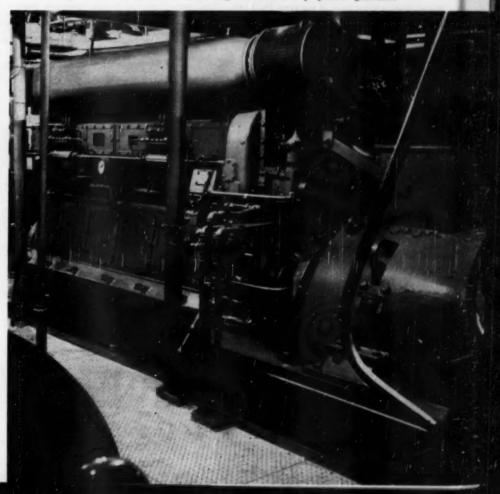
Displacement at full draught	795 tons
Length overall	77 ft0 in.
Length between perpendiculars1	63 ft6 in.
Breadth moulded	32 ft0 in.
Breadth over rubbing bars	32 ft4 in.
Depth moulded to main deck at side	13 ft0 in.
Fuel oil capacity	1.393 gals.
Lubricating oil capacity	340 gals.

As mentioned previously, the design of the propulsion electrical equipment on these tenders largely resembles that of the lighthouse tender Juniper. The two propulsion motors are each rated at 440 hp., 250 volts, at 195 rpm. The motors are totally enclosed and are ventilated by air from the room drawn through them and exhausted by ducts mounted directly over the motor commutators. The propulsion generators, like the propulsion motors, are shunt wound and arranged for separate excitation at 12 volts. These generators are self-ventilated, discharging air into the engine room. The engine room is ventilated as a compartment. Special series windings are provided on the generators for connection to the starting battery when the generators are used as motors to crank the diesel engines. Excitation and auxiliary



Main engine room looking forward shows visual and audible alarm board on forward bulk head,

Starboard Main Propulsion Unit. Six-cylinder Cooper-Bessemer 550 bhp. GS diesel engine, direct connected to a Westinghouse 355 kw. propulsion generator.



power is furnished by two 40 kw., 120 volt, 330/730 rpm. generators. Each 40 kw. auxiliary generator is mounted in tandem with a propulsion generator driven in turn by the main diesel engines. In addition to the 40 kw. auxiliary generators, there are two separately driven diesel-generator sets which may be used in port or at sea when operation of the propulsion diesels is not required. One diesel-generator set is of 75 kw. capacity. The other is rated at 16 kw., both are Lister-Blackstone diesels. Excitation for the propulsion equipment is supplied by either of the 40 kw. units working through two small excitation motor-generator sets. One motor-generator set furnishes excitation to the port propulsion motor and generator. The other set supplies excitation to the starboard motor and generator. Each motor-generator set consists of a 15-hp, motor and two 5 kw, exciters. One 5 kw. exciter is used for exciting the propulsion motor, while the other 5 kw. excites the corresponding propulsion generator. The source of excitation is extremely flexible. Under emergency conditions, the motor generator sets are not used, and the power to excite the propulsion generator and motor fields is taken directly from the auxiliary bus.

Control of the propulsion equipment depends on a combination of the variable voltage and the variable engine speed systems. Each of the two master speed control handwheels in the engine room is graduated in twelve speed points for ahead and astern directions. The first eight settings occur with the diesel engines running at an idling speed of 330 rpm. With the motor field current held constant, the generator field current is increased in eight approximately equal steps from zero or

"Stop" position up to the maximum in the eighth position, thereby increasing the generator voltage and correspondingly the voltage impressed on the propulsion motor armatures. From the eighth to twelfth positions, the motor speed is increased by maintaining a maximum generator field and increasing the engine speed in approximately equal increments from 330 rpm. to 730 rpm. to give a corresponding increase in generator voltage. The speed of each propeller is controlled in the engine room by a single handwheel. This handwheel controls a field rheostat operating on the 5 kw. exciter of the excitation motor-generator set, to vary the propulsion generator voltage and also ties in with a pneumatic transmitter and receiver system to vary the speed of the diesel engine. Duplicate control equipment is furnished in the pilot house so that the control of the ship may be shifted from the engine room to the pilot house and vice versa by a single transfer switch.

The automatic torque regulator connected in the propulsion motor exciter field circuit is a particularly interesting feature of these tenders. This regulator automatically provides maximum engine loading under all conditions. It also limits the load on the engine to its nominal rating. In a high sea that would lift the propeller partially out of the water, or if the ship is subject to frequent maneuvering, some means must be provided automatically to limit and regulate the torque transmitted through the electrical system to the diesel engine. The Silverstat regulator is applied for this duty. This regulator has an interpretive element connected across the propulsion motor commutating field and resistance steps connected in the motor exciter field

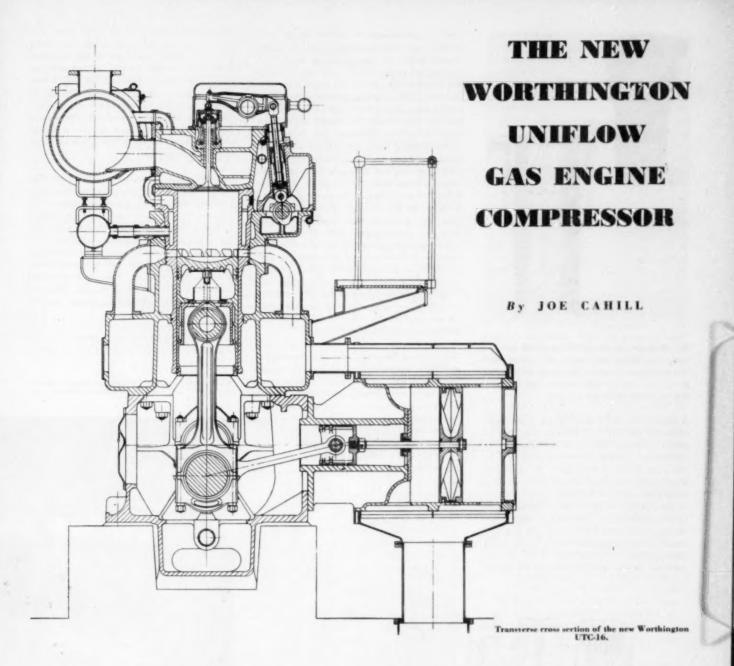
circuit. Any sudden change in load on the propeller produces a corresponding change in motor armature current. Since the motor commutating field is a series field, the voltage drop across it varies with the armature current. The regulator interprets the armature current and increases the motor field current to a value where the additional torque occurs at a lower speed and does not overload the engine.

Exhaustive tests were conducted during the maneuvering trials of the Finistere at Victoria to compare the operation of the ship with and without this torque regulator. Oscillograph records were made during crash stops. Analysis of the oscillograms showed that, with the regulator in operation, the propulsion armature current exceeded rated value (1.440 amperes) for approximately five seconds and reached a peak of 2,380 amperes, at which point a voltage of 152 volts was recorded. This resulted in a one per cent overload on the diesel engine, regarded as negligible. Without the regulator in operation, the current exceeded rated value for approximately 161/2 seconds. At its peak, the current exceeded 2,700 amperes, during which a voltage of 192 volts was recorded and resulted in a 44.2 per cent overload on the diesel engines.

The predicted performance was attained at the builder's trials held in the Straits of Juan De Fuca off Victoria, British Columbia. The overall efficiency of the electric propulsion equipment was 84.5 per cent. Since the French Lighthouse Service contemplates a normal cruising speed of 11.5 knots for these vessels, it is obvious that they possess good margin of reserve speed and power.

Representatives from many of the firms whose joint efforts built the fleet of French lighthouse tenders, left to right: Messrs, Izzard, General Manager of Yarrows, Ltd.; Capt. Farina, French Merchant Marine; Baudelaire, French Supply Mission, Washington; Wallace, Yarrows, Ltd.; Hassilev, French Supply Mission, Montreal, Canada; Malcolm, George G. Sharp, New York; Haverstick, Westinghouse Electric Corp., Pittsburgh; Capt. Greetham, Pedder & Mylchreest of London; Petiot, Technician French Merchant Marine Mission; Erickson, George G. Sharp, New York; Jenner, Cooper-Bessemer Corp., Seattle Office; Jones, Cooper-Bessemer Corp., Seattle Office; Burke, Inspector for French Supply Council; Anderson, Yarrows, Ltd.; (kneeling): Cooper, Washington, D. C., Office, Cooper-Bessemer Corp.





THE first of a new type of angle gas engine compressor unit designed by Worthington Pump and Machinery Corporation and designated by them as their type UTC-16, was placed in service at the Charles F. Glore Compressor Station of the Tennessee Gas Transmission Corporation line in West Monroe. La., late in 1949. The gas engine end of this unit is two cycle and embodies several outstanding changes from the hitherto standard form used with units of that type. These changes are the result of seven years of carefully planned research based on the Kadenacy patents and covering problems of scavenging, combustion and cooling. The most outstanding of these changes is the use of uniflow scavenging. The new engine is covered by a long list of United States and foreign patents.

During the early part of February, many gas pipe line engineers and officials of many of the country's large gas transmission companies visited this plant and saw this newest pipe line gas engine compressor in actual service—at full load and full speed. The Tennessee Gas Transmission Company men have done a splendid job of installation and there were many comments on the fine appearance of the station and the smooth running new engine.

The daily need for the constant service of this new eight-cylinder unit on the pipe line system did not permit demonstration of the engine's performance at other than full load and full speed, but those visitors who have previously been at the Buffalo works of Worthington had seen the three-cylinder experimental unit on the Worthington research test stand do many things which had not previously been possible with a two-cycle gas engine. Among those outstanding in their minds were exceptionally fast starting: even firing at no load on all cylinders; unbelievably smooth running at low speeds—down to one-third of standard; overload capacities beyond any normal field requirements; extremely low exhaust temperatures at all loads—and good fuel economy.

When observed by this writer early in February, this engine was for several weeks and had been operating at full load. It was handling approximately 61.5 million cu. ft. of gas per 24-hour day (corrected to 15.025 psia.). This gas enters the compressors at a suction pressure of 490 psig., and is discharged at 765 pounds psig. The eight-cylin-



der, 16x16 unit develops 1600 hp., at 320 rpm., 77 bmep., and drives four compressor cylinders and two scavenging cylinders. Fuel gas in the manifold is at 31 psi, and is directly injected into the cylinders by Worthington gas injectors.

A study of some of the design details of the engine shows why the UTC-16 is different from other gas engines. Many of these details can be seen in the illustrations herewith. Uniflow scavenging is an important feature of this engine. As applied by Worthington, air enters through ports extending around the entire circumference of the lower end of the cylinder; and the exhaust is through valves in the cylinder head. The timing of uniflow scavenging, as compared with conventional loop scavenging, is shown diagrammatically in the accompanying graph. It will be observed that the inlet port area is over twice as great and the exhaust

area is approximately 50 percent greater with uniflow than with the ordinary loop scavenging. Further, while with loop scavenging, the point of opening and closing of both inlet and exhaust is determined by the position of a piston in its cylinder, with uniflow scavenging as employed by Worthington, this is so only for the inlet air. Due to the fact that the exhaust is through cam-operated valves, its opening and closing may be arranged at the optimum point with relation to the inlet opening and closing. This permits a much earlier exhaust opening with the result that a greatly increased exhaust area is available for blow-down before the uncovering of the intake ports. This facilitates the removal of the products of combustion. The greatly increased intake and exhaust areas permit the passage of larger volumes of scavenging air with lower scavenging air pressure. Again on the closing side of the exhaust, the camcontrolled valves permit earlier closing, resulting in appreciable supercharging. The comparative blow-down and the supercharging effect obtained by uniflow scavenging are shown on the chart by the single-sectioning and the flow-through for loop scavenging by the double-sectioning.

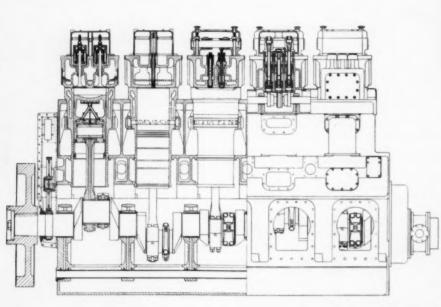
The increased blow-down, the supercharging and the flow of air in a straight line, result in charging the cylinder with a greater weight of air so that a much higher mean pressure can be developed without increased temperature. Not only is there a greater weight of air in the cylinder, but the proportion of pure air in the total weight is also much greater. This results in reduced fuel consumption—lower than can be obtained with equal compression ratio in loop scavenging.

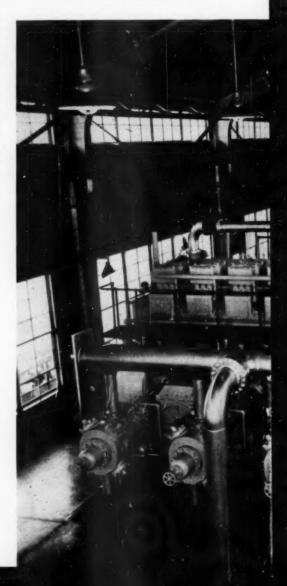
There are many operating advantages inherent in this design. Because the inlet ports occupy the entire circumference, the lower part of the cylinder maintains a uniform low temperature under the influence of the inlet air. The ports are not subjected to the heat of the exhaust on one side and the cool air on the other. This low temperature eliminates carbonization of oil on the ports. The cylinder head and the upper end of the cylinder are subjected only to the normal heat of a two-cycle engine, reduced by the increased efficiency of the entire scavenging system. The result is even lower and more uniform temperature stress in the cylinder head than on a four-cycle engine, where a cool inlet valve and a hot exhaust valve must be located side by side. These features make the UTC-16 capable of higher ratings without excessive temperature strains.

The main frame construction permits of removable cylinder liners instead of separate cylinders—with lower replacement cost. The cylinder water jacket is cast with the liner. Because of the low temperature at the bottom end of the cylinder, water cooling is not required below the inlet ports. This permits the jacket water space to be entirely enclosed in the casting without a joint to pack and seal from the crank case. Thus, the many advantages of a removable liner are obtained without its one disadvantage of requiring sealing from the crank case.

A partition near the top forces the cooling water around the entire circumference of the liner at

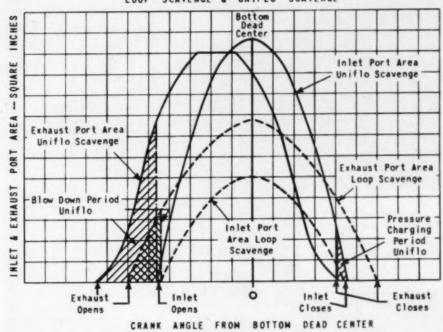
Worthington Uniflow UTC-16 gas engine compressor (in the foreground) as installed at Monroe, La.

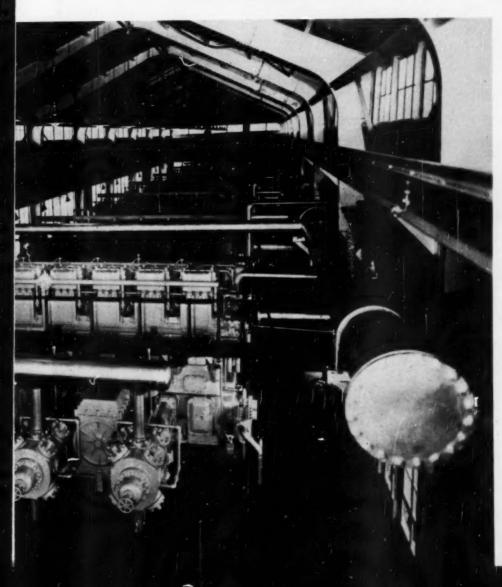




COMPARISON

INLET & EXHAUST PORT CHARACTERISTICS
LOOP SCAVENGE & UNIFLO SCAVENGE





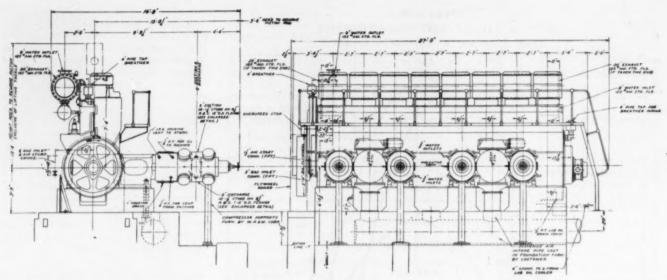
high velocity, resulting in maximum cooling efficiency. The only packing required on the liner-to-frame fits is at the ports to prevent the low pressure scavenging air from escaping to the atmosphere and at the lower fit to prevent the escape of oil splash. The piston design embodies important improvements. The wrist pin is carried in a separate piece, bolted to a transverse wall in the piston. This results in an unbroken outer piston wall with climination of the strain caused by the wrist pin fit. The absence of holes on the piston wall also improves the heat flow and prevents unequal heat stresses present in conventional construction.

The heavy duty valve gearing; conical type cylinder heads with directional water cooling; connecting rods with assured perfection of bearing alignment; and other carefully designed details assure continuity of service and low maintenance cost for this—Worthington's latest product.

Safety devices on the compressor include four spring-loaded explosion doors on the crank case, low oil pressure and high water temperature, and over-speed shut down. Other equipment includes Pickering governor, Bendix Scintilla timer, Cuno edge-type filters, Cook piston ring, Alnor pyrometer and McCord lubricators.

While this compressor is the first of its kind installed, another is being erected at the Scott City, Kansas, station of the Kansas-Nebraska Gas Company. The foundation for another of these UTC-16 Worthingtons has already been poured at the Glore compressor station and will set alongside the first. which is illustrated in this article. A Burgess-Manning intake snubber has been installed to handle the large volume of scavenging air drawn in by the scavenging cylinders and is doing an excellent job of delivering the air without excess noise. This Burgess-Manning cleaner-snubber is a unique combination unit which combines a maximum intake air cleaning and silencing efficiency. It is recommended especially for gas or diesel engines that are pump or positive-displacementblower scavenged. Each cleaner-snubber consists of two snubbing chambers to smooth the air flow. and one cleaning chamber which incorporates from one to fourteen standard Burgess-Manning cleaner elements, depending on the capacity of the unit. The cleaner elements are serviced through one or more large access doors, held firmly in place by spring clamps.

The Tennessee Gas Transmission system, of which the Glore station is No. 6, comprises 1,834 miles of pipe of 24-inch, 26-inch and 30-inch sizes, and sixteen compressor stations developing approximately 250,000 hp. The line went into service October 31, 1944, and is delivering an average of 800 million cu. ft. of natural gas per day. The line starts at Falfurias. Texas, very close to Brownsville, and carries gas to the eastern seaboard. Extensions to the line already approved and to be in operation in 1950 will add 1,000 more miles of pipe, and 60,000 hp., and by December of 1950 will be delivering one billion cu. ft. of gas per day, and will add the city of Buffalo to its distribution network. Fourteen more Worthington UTC's are on order, which with



the additional Clark and Cooper Bessemers will increase the installed hp. to approximately 310,000.

The Glore station itself consists of two compressor buildings. Building "A" has ten 1,000 hp. Worthington LTC units, and building "B" has seven 1,000 hp. LTC units and one 1,600 hp. UTC unit. The plant was built by the Stearns-Roger Corporation of Denver, in 1944. The air intakes on building "A" are ten American Air Filter cycoils, and seven in building "B" are Continental air filters. Maxim exhaust silencers are used throughout. Two Hudson and one Marley cooling towers supply the cooling water for the engines and for the gas. The water is obtained from three deep wells on the property. One Hudson tower is used for cooling jacket water and one for gas-cooling, while the Marley cooling tower is a duplex unit, one side

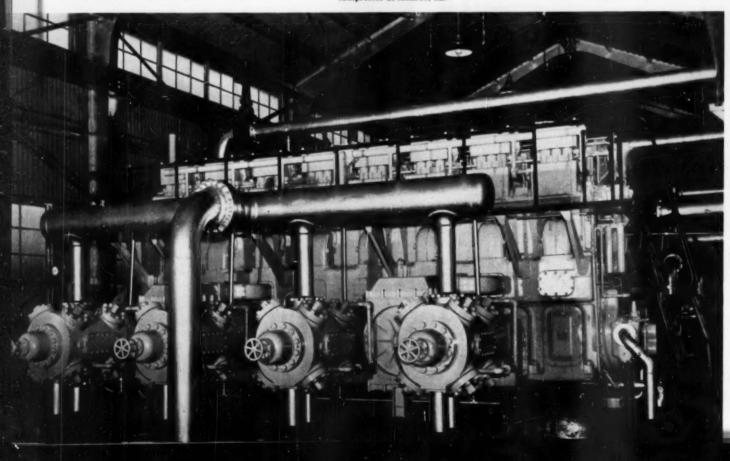
cooling jacket water and the other gas. Three Hilco oil reclaimers are used for the lube oil.

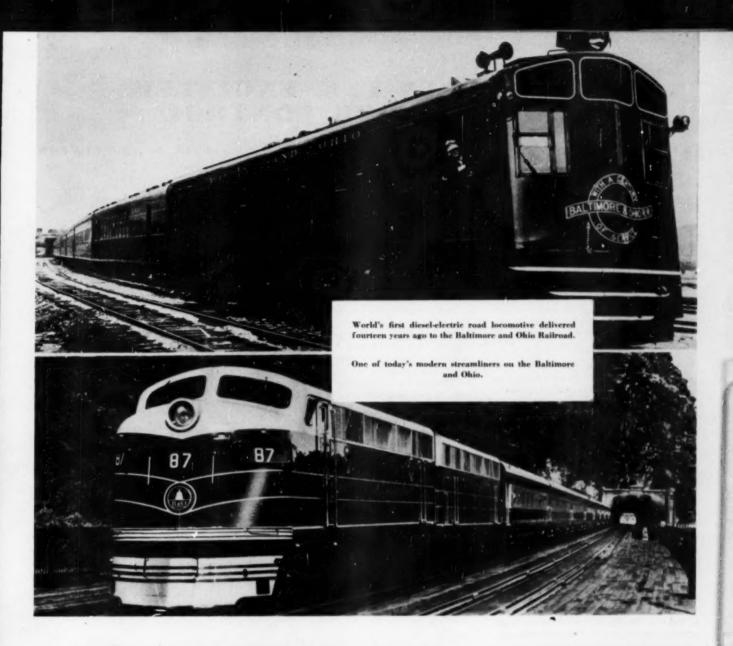
In the auxiliary building are four engine generator sets and two motor-driven compressors. Three of the generating sets are Worthington-Westinghouse, and one is an Ingersoll-Rand-Westinghouse. The three Worthington engines are six-cylinder 400 hp. at 450 rpm. The Ingersoll-Rand is an eight-cylinder, delivering 370 hp. at 400 rpm. The generators are Westinghouse 312 kva., 480 volt, 60-cycle, three-phase, 80 percent power factor with belt-driven exciters. All four engines are equipped with Hilco oil filters, American Air Filter cycoil air cleaners, Maxim silencers, and Mercoid safety controls. All

Worthington's new UTC-16 Uniflow gas engine compressor at Monroe, La.

switch gear is Westinghouse, as well as all motors. The auxiliary pumps and compressors are Worthington.

Another very interesting feature of this particular compressor station is that all exterior equipment, such as water lines, intake and exhaust snubbers, are metallized rather than painted. The water lines are metallized with pure zinc, and the other equipment with pure aluminum. This metallizing is applied in the ordinary manner with metallizing wire, and is designed to eliminate the periodic repainting usually so necessary in this type of installation. This work has been done by Mr. Fletcher Ferguson, Station Superintendent, and under the direction of Mr. H. G. McDowell, Division Superintendent, and Mr. John Talbot, Superintendent of Compressor Stations.





14 YEARS OF DIESEL-ELECTRIC LOCOMOTIVES

By DOUGLAS SHEARING

OOKING at the enormous number of diesel locomotives on the railroads today, it is hard to realize that it is only fourteen years since the first diesel-electric road locomotive was delivered to the Baltimore and Ohio Railroad. This trailblazer was delivered by the Electro-Motive Division of General Motors Corporation, August 22, 1935, and although the first of its kind, it was given the number 50.

After a few days' trial runs it started hauling the Royal Blue streamliner between Washington and New York and from the outset was master of the job. Previously the B & O had built two high-speed steam locomotives for this fast run. One weighed 417,800 lbs. and the other 527,000 lbs., yet

the diesel, weighing only 252,000 lbs., easily outhauled them.

The advent of the No. 50 on the B & O has proved almost as significant in the history of railroads as was the advent of the B & O's Tom Thumb, first steam locomotive built for any American railroad, 120 years ago. For today 47.5% of the miles made by passenger train cars, 31.5% of the ton miles made by freight cars, and 47.2% of the total yard switching hours done by railroads, are done by diesel-electric locomotives. With few exceptions the American railroads are now buying diesel-electric locomotives exclusively. Several comparatively small lines are already completely dieselized. One of the three principal locomotive builders has quit building steam locomotives.

Behind the success of the diesel, of course, is its economy. A diesel locomotive uses only a trifle more than a teaspoon of oil to haul a ton of freight one mile.

Furthermore, because of the diesel engine, repairs and replacements can be made quickly and easily. . Hence, diesels are almost constantly available for service. They seldom miss an assignment.

Several of the original units in the B & O's present fleet of 345 diesels have more than two-and-a-half million miles of running to their credit, and they are adding mileage to the record now as fast as when they were first put into service. Diesel-electric locomotives have long since earned their present predominant position.

DIESELS PLUS U.S. ENGINEERS EQUALS FLOOD CONTROL

TESEL GENERATOR units furnish power for the first all-electric mattress sinking plant of its type ever built now being used by the Corps of Engineers, Memphis District, in their program of stabilizing the banks of the lower Mississippi River. Three diesel generating units with a total rating of 750 kw. on the lower and upper mooring barges furnish power for operating all machinery on the mattress sinking and mooring barges and a diesel generating set of 30 kw. capacity on the mattress sinking barge provides power for lighting and small tool operation during week-ends and shutdowns of the main generating plant. A 10 kw. diesel generating set is used for auxiliary power for the upper mooring barge. In Figure 1, the Nordberg six-cylinder generating set is shown as installed in the upper mooring barge.

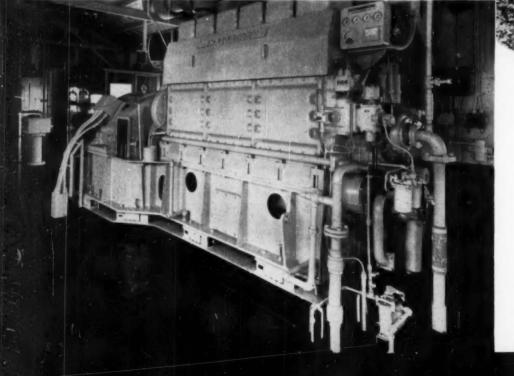
The principal means of stabilizing the banks of the Mississippi River in their present location to prevent danger to such permanent structures as levees, rail and barge terminals and city water fronts is revetting that part of the bank below the water with articulated concrete mattress, and placing rock riprap or hot sand and asphalt mix on the upper bank. The units which go to make up the articulated concrete mattress for underwater use are made in onshore casting plants located in convenient locations throughout the district and are then transported to the site of the revetment by barge. The mattress sinking plant proper consists of a mattress sinking barge, lower and upper mooring barges, and in some cases a spar barge for use with lower mooring barge. The entire plant was built by Avondale Marine Ways, Inc., at New Orleans. The completed unit was delivered to the Memphis District, Corps of Engineers, early in 1949, and was used effectively during the past year.

In Figure 2, the former mattress sinking plant used by Corps of Engineers, Memphis District, was

powered by steam plants. This view of the old plant shows articulated mat sinking plant preparing to anchor inshore edge of concrete mat to bank by means of launching cables. Just as in the case of the new diesel-electric mattress sinking plant, the first launching of the mattress is made by drawing in the arms supporting the mat extending inshore from the barge. Successive launchings are made by moving the sinking plant out from the shore along mooring barges which in this picture are seen just beyond the mattress sinking barge. The crew on the deck of the sinking plant assembles the mat sections as they are placed over the rollers by swinging rollers from the mat barges. The mooring barges are used to assist in keeping the plant in position by means of cables operated by winches. These winches were formerly operated by steam and are now diesel operated. A four-inch gravel blanket is used on finished grade. In Figure 3 may be seen the two Nordberg six-cylinder diesel generating sets which are installed on the lower mooring barge of the new mattress laving plant.

Each barge making up the new set is symmetrical about the mid-section so that for operation on the opposite bank it is necessary only to reverse the position of the mattress sinking barge. The lower By WILL H. FULLERTON





DIESEL PROGRESS

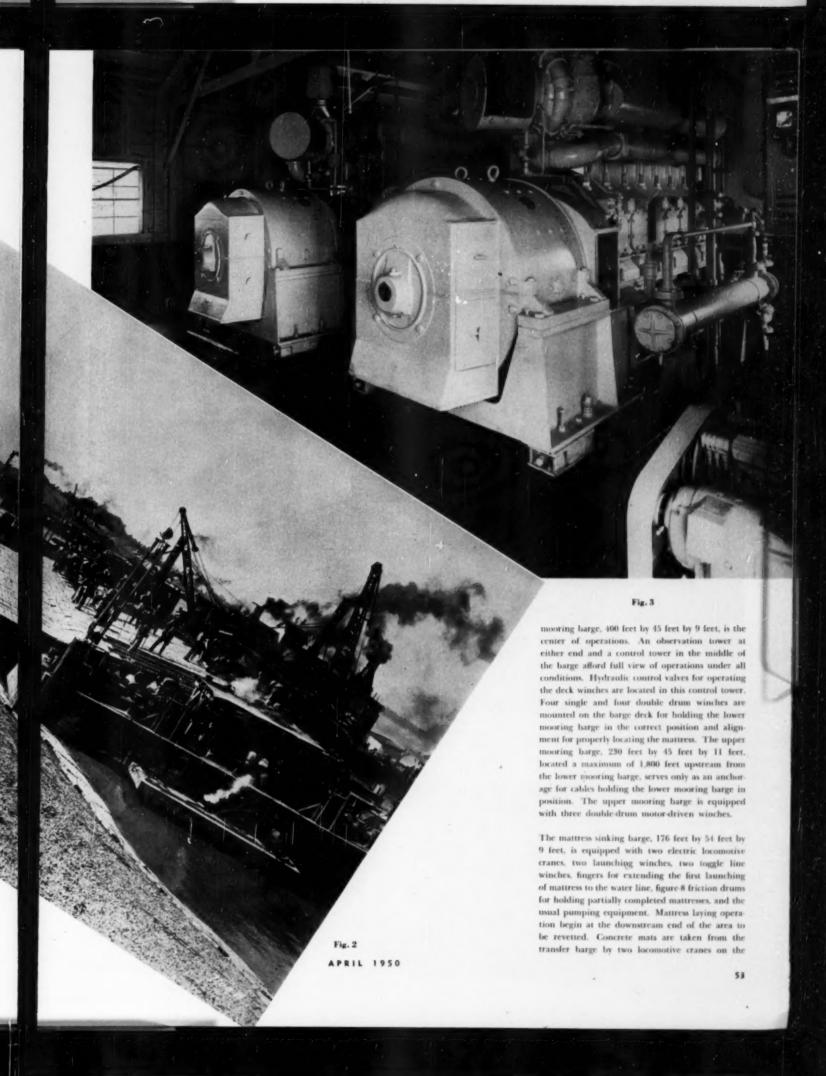




Fig. 4—Aerial view of bank revetment operation when the former steam Mattress Sinking Plant was being used. Three stabilization methods are shown—bank grading and placement of gravel blanket, placing under water mattress and upper bank paving.

mattress sinking barge and placed on the mattress deck of the sinking barge, where they are secured to steel cables anchored onshore. When the full width of the mattress deck is covered by interconnected concrete mat, the mattress sinking barge is moved offshore until the mattress deck is clear and ready for the assembly of another interconnected mat and for the second launching. This procedure is repeated until the required width of the revetment is obtained. The lower mooring barge and the mattress sinking barge are then moved upstream a distance slightly less than the mattress width and a second mat is laid over lapping the first mat from five to ten feet. This process is continued until the desired length of revetment is secured. In Figure 4 an aerial view of bank revetment operation when the former steam mattress sinking plant was being used, is shown. Three stabilization methods are shownbank grading and placement of gravel blanket, placing underwater mattress and upper bank paving.

Power for the operation of the electric cranes, the winches, fingers and figure-8 friction drums on the mattress sinking barge is supplied from the lower mooring barge through a current transfer system. A pair of Nordberg four-cycle, six-cylinder, 9-inch by 111/2-inch supercharged diesel engine generating units each rated at 250 kw., 240 volt direct current, furnish the power for operating the winches and the machinery on the mattress sinking barge. In addition to the engine room, the lower mooring barge has a boiler room housing a steam generator, a distilling room, an ice plant, a machine shop, stock rooms and a first aid station. A 30 kw., 240 volt direct current Buda diesel generating set is provided to supply power for lighting and small tool operation on the mattress sinking barge when the main generating plant is shut down.

Power for operating the three double-drum, motordriven winches on the upper mooring barge is provided by a single Nordberg diesel generating set identical with the two untis on the lower mooring barge (see Figure 1). A U. S. Motors Corp. 10 kw., 240 volt direct current diesel-generating set is furnished as an auxiliary power supply unit on the upper mooring barge.

LIST OF EQUIPMENT

Exhaust Silencer—Maxim.
Fuel oil filter—Hilliard.
Fuel oil filter—Purolator.
Governor—Woodward.
Generators—General Electric.
Heat exchangers—Ross Heater & Mfg. Co.
Intake air filter—Air Maze.
Lube oil cooler—Ross Heater & Mfg. Co.
Lube oil filter—Hilliard.
Lube oil pressure—Viking.
Main engines—Nordberg.
Pyrometer—Chicago Electric.
Raw Water Pump—Gorham-Rupp.
Vibration isolation—Korfund.

45-ton G.E. Diesel-electric locomotive at American Aggregates plant in Columbus, Ohio.

By WILL H. FULLERTON

THOUSAND DOLLARS a month savings at a lime works in Ohio; \$160 a month savings in fuel alone at a cement plant in Maryland; 20 per cent faster operation at an aggregates company in Columbus—these are examples of the records that diesel-electric locomotives are setting in rock products work all over the country.

In a search to keep down overhead through more efficient and economical materials handling, rock products companies have found rail steam power too expensive for intraplant switching and transfer work. The outcome of many cost surveys and trials has been a swing to diesel-electric loccmotives.

In December, 1947, Kelley Island Lime and Transport Co., at Clay Center, Ohio, replaced a 65-ton steam locomotive with a 50-ton diesel-electric unit. Since then, two eight-hour shifts for the steamer have been cut to one nine-hour shift for the new locomotive; fuel costs have dropped from \$15 a day to \$14 a week; availability has risen to nearly 100 per cent; and total savings of \$1,000 a month have been estimated by company officials.

The diesel-electric operates over seven miles of fairly level track, hauling up to twelve 30-ton cars loaded with lime, by-products, residue, or waste.

At North American Cement Co., in Security, Md., a diesel-electric unit took over the work of a steam locomotive in March, 1948, and has been putting in a 104-hour week ever since. This unit, a 45-tonner, hauls as many as 75 loaded cars a day. During its eight-hour day shift it switches cars loaded with cement from the pack house to the railroad line and brings in coal and shale. At night and on Sundays it hauls limestone from the quarry to the plant.

Although 50 per cent heavier than the steamer it replaced, the unit costs only about half as much in fuel and maintenance to operate. According to Plant Engineer H. Hilton Long, "The diesel-electric is cleaner to operate, more efficient, and more economical than the steam locomotive."

Another 45-ton unit, at the Weich Avenue plant of American Aggregates Co., in Columbus, Ohio, has been in operation for two and a half years.

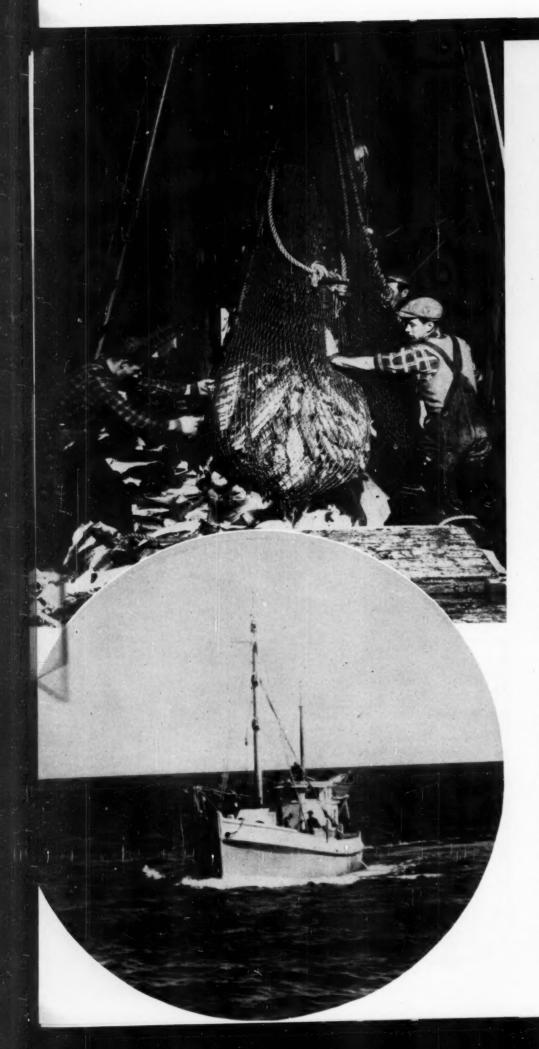
The diesel-electric locomotives described in this article are all built by General Electric, Schenectady, N. Y.

Photographs courtesy of General Electric.

G.E.industrial 45-ton switcher at the plant of North American Cement Company, Security, Maryland.

G.E. 50-ton Diesel-electric locomotive at work at Kelley Island Lime and Transport Company, Clay Center, Ohio.

DIESEL-ELECTRICS IN ROCK PRODUCT FIELD SHOW SAVINGS OVER REPLACED STEAM POWER



DIESEL DRAGGERS

By DWIGHT ROBISON

THE cod fishermen of Gloucester County at the extreme northeastern tip of the Province of New Brunswick need no introduction to the fishing industry. The people of this region have a long and illustrious past in the fishing annals of the world. And the story of their fishing methods and customs provides a tale as interesting as any that come from fishing grounds of the North Atlantic.

Until just recently, the fishermen of Gloucester County carried on their fishing from small schooners and tiny open boats in the waters of the Gulf of St. Lawrence. Fishing methods were slow and the hardships were many, since sudden storms could wreak havoc upon equipment and men. Early in 1947 the New Brunswick government, through its Fishermen's Loan Board, developed an expansive scheme to improve the lot of New Brunswick fishermen. Through generous loans and a long amortization period, the Board built for the fisherment a new type of craft which was named the Gloucester Dragger. The Gloucester Draggers have been so named because this name is synonymous with the work carried on from two great deep-sea fishing areas, Gloucester, Mass., and Gloucester County, N. B. The draggers are 59 feet overall, have a 15-foot beam, 5.9-foot draft and 37 tons gross. Frames are of oak, with planking of pine sheathed with spruce. The vessels, known as "half and half draggers" (dragging being done from one side only), were built for the New Brunswick fishermen at a cost of \$26,000 each.

Using Grimsby doors and a No. 35 drag, each vessel is capable of dragging from 20 to 90 fathoms at a speed of between 3½ and 4 mph. The hold, which is divided into nine bays, is capable of holding up to 60,000 lbs. of fresh fish. Each vessel is out for a maximum period of four days. Past experience has shown that the Gloucester Dragger has a yearly average catch of at least double that of the best schooner operating in the same area. During the present season, these draggers have landed weekly catches averaging over 50,000 lbs. each, with a record catch of 67,000 lbs. in three days, and one of these draggers landed 109,000 lbs. in one week.

Five of these vessels were built in 1947 and they proved so successful and so popular that more were added, until the fleet now numbers twenty. Fourteen of them are powered by 115-hp. Caterpillar diesel marine engines, six by GM, turning a propeller mounted on a 5½-inch Tobin bronze shafting. Each vessel carries a fuel tank for 600 gallons, giving approximately 120 hours of cruising time at an average speed of ten knots. Thirty more fishing craft of various descriptions ply their trade in and out of Chaleur Bay, or as it is known in French, Bai Des Chaleurs, making a total of about fifty fishing boats in operation.

Since the draggers only operated twenty-one weeks of the year, between late May, when the ice leaves the Gulf of St. Lawrence, and mid-September, the crews exert almost superhuman efforts in their endeavors to bring back record catches of fish. The Gloucester No. 10, for example, under the command of Captain Edgar Blanchard, made a record catch of 1,235,000 pounds of cod during the twenty-one weeks of its operation.

Using Grimsby type doors and a drag 75 feet in length with a 45-foot opening, the vessel is capable of dragging from 20 to 90 fathoms with 40 to 45 fathoms being the average depth fished in on the trip made by the Gloucester No. 10, starting July 4th from Shippigan and returning on July 7th. During the dragging operations on this trip, approximately 150 fathoms of wire rope was used on each door, dragging at 45 fathoms. When unloading, the drag is hauled in and the loose net is pulled over the side of the vessel until the full bag is reached. A hitch is then taken around the bag and by means of pulleys and the winch, the bag is hoisted on the deck. With the bag in a raised position, one of the fishermen pulls a rope unfastening a drawstring at the bottom of the bag, which opens the net and the fish spew onto the deck. The drag is then placed overboard again, while the fishermen gut and clean the fish and stow it in the hold. In this process, two members of the crew slit the fish open and the other two members remove the liver. which is used for the manufacture of cod liver oil. The rest of the fish entrails are thrown overboard. The gutted fish are then placed in the hold.

Almost 100 per cent of the fish caught in the bag are cod, and a good catch or bag full is about 500 fish. The fish average about five pounds apiece although one was caught and photographed, weighing in the vicinity of 75 pounds. At one time, a full net of fish was brought up containing approximately 1,600 fish weighing over four tons. This terrific weight caused the boat to list heavily, breaking a block and parting a new 1-inch diameter manila rope. Eventually the net had to be cat and a large portion of the catch had to be released back into the sea before the net could be hauled aboard.

After returning to Shippigan, the fish were unloaded, where they were further cleaned, 45 per cent of which went to frozen cod fillets and the remaining 55 per cent to salt fish, which is made into boneless fish. Most of the fish landed at Shippigan were purchased by Gorton-Pew (New Brunswick), Ltd., to be made into fillets, boneless or dried.

Last year, the twelve draggers which were then in operation landed about 10,000,000 lbs. of codfish which amounted to about 45 per cent of the total cod catch for the entire Province. Seven of these Gloucester craft operated for Gorton-Pew. Ltd., last year, and their catch average 850,000 pounds of codfish for each craft.

No story of the Gloucester County fishing fleet would be complete without mention of that colorful ritual known as "The Blessing of the Fleet," which has taken place annually in this northern harbor for 150 years. Having its origin in the blessing Christ gave the fishermen of Galilee, the ceremony was introduced into this region by the first missionaries who came here early in the nineteenth century and has been carried out every year since. This year the fleet was blessed on July 3rd at the little village of Lameque, on Shippigan Island, at the mouth of Chaleur Bay. Approximately fifty vessels of all descriptions, including nineteen Gloucester Draggers, congregated first at Shippigan, where they then proceeded in single file to the small wharf-encircled harbor at Lameque. Over 4,000 persons greeted the fleet as one by one the boats entered the harbor. Bishop A. Le Blanc of Bathurst, N. B., who conducted the service, speaking in both English and French, paid high tribute to the fishermen who gained their livelihood from fish caught in the high seas, often risking their lives in the pursuit of their hazardous occupation. Premier J. B. McNair, of New Brunswick, attending the event for the first time, congratulated the fishermen on their achievements of

the past year and complimented those who were responsible for the decorations and planning that went into the memorable occasion. The Honorable J. Andree Doucete, Minister of Reconstruction and President of the Fishermen's Loan Board, spoke briefly to the audience in French. He, too, congratulated the fishermen on their past performance and spoke of the great contribution that the fleet in Northern New Brunswick was giving to the provincial treasury. He made note of the great strides made in fishing methods and spoke of the many fine vessels in the harbor. At the closing of the event, the audience loudly cheered the Bishop and his attendants as they left the platform, waving flags and sounding horns, whistles and sirens. The color and pageantry of this annual custom is not quickly forgotten by those seeing it for the first time.

And so, as Wm. Stairs, Son, and Morrow Ltd., Caterpillar dealer in nearby Halifax, so aptly put it, "the advance of time has bought a new phase of life on the sea, and as reluctant as we are to depart with the picturesque sailing ship which has become a maritime tradition, immortalized on Canadian currency, maritime fishermen are laying aside thoughts of those bygone days with their past glories, and are advancing toward new horizons with new vessels to meet the growing challenge of competition." Fine, modern, powerful vessels, such as the Gloucester Draggers, depict this determination inherent in progressive maritimers, to maintain the position established over a century ago, of leadership in the fields of shipbuilding and commercial fishing.



CASCADE LAUNDRY MAKES DIESELS PAY

By ROBERT N. YOUNG

THIRTEEN years and two months ago the Cascade Laundry in Brooklyn was the largest laundry in the world. It was so claimed by the owners and quoted in the February, 1937, issue of Diesei. Procreess and today we can repeat that statement. Handling over a million pounds of laundry a week, together with dry cleaning, rug cleaning, linen supply, also family laundry and diaper services, this manmoth institution employs 1,500 people today as compared with 1,100 when we last visited them, and is now operating 300 trucks serving the entire metropolitan area. It will be seen that Cascade Laundry has expanded in proportion to the growth of the vast community it serves.

Mr. Max Troy, for many years chief engineer of the company, is credited with development of most of the special and highly efficient machinery used throughout the plant, the robot-controlled washing wheels being especially noteworthy. Day by day operation and maintenance of plant machinery is under Mr. Anthony Bouza, supervising engineer.

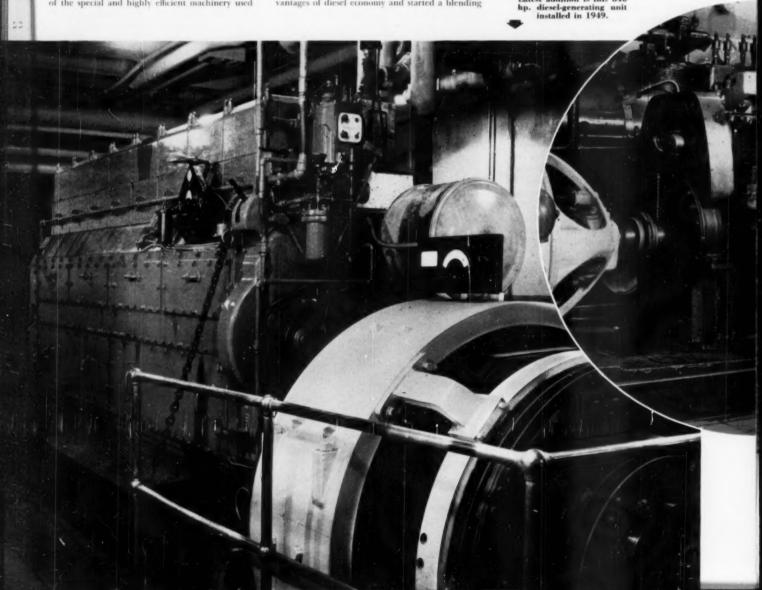
The company has progressively developed its power generating facilities in keeping with good economy and proper heat balance. Originally the prime movers were steam units consisting of both reciprocating and turbine machinery, the exhaust from which gave up its heat to water for various plant uses. But as the gradual installation of electrically-driven equipment increased the load on the steam units it was found that there was an excess of exhaust steam beyond the heat requirements of the plant.

At this point Mr. Max Troy recognized the advantages of diesel economy and started a blending

of prime mover equipment by installing a 300 hp., 6-cylinder Chicago Pneumatic diesel, direct connected to a 200 kw. Crocker-Wheeler d.c. generator, and 6-cylinder, 1,750 rpm. Buda diesel driving a 35 kw. Westinghouse d.c. generator. This was in November, 1936, and at that time the turbine unit was shut down, but is still available for stand-

About thirteen years old, this 35 kw. Buda set carries the night lighting load regularly.

Latest addition is this 640



by service. The 35 kw. diesel-generator unit is now used for night lighting and stands idle during daylight hours. The large diesel unit supplies current for general plant needs.

The next move was brought about by an increased demand for compressed air throughout the plant, required for the operation of robot controls on the washing wheels, also for operation of pressing machines. This move consisted of the installation of a General Motors 2-cycle diesel belted to an Ingersoll-Rand compressor and a similar motordriven compressor for standby.

By 1948 the growth of Cascade's business had so increased the electrical load that additional generating facilities were required. And in December of that year a long step was taken with the installation of a 640 hp., 720 rpm., Chicago Pneumatic diesel and a 450 kw. Crocker-Wheeler generator which has been in continuous service since early 1949. The company has thus assured itself of continuous power supply by developing its plant around diesel efficiency and dependability.



Ninety hp. G-M diesel and compressor which sup plies compressed air for the laundry.

LIST OF EQUIPMENT

Main engines-Chicago Pneumatic Tool Company, Auxiliary engine-60 hp., The Buda Engine Co. Auxiliary engine-90 hp., General Motors Corp.

Generators - Crocker-Wheeler for main engine; Westinghouse for the Buda: Delco for the General Motors.

Pyrometer-Alnor-Illinois Testing Labs, Inc. Governor-Pickering Governor Company-main engine: Woodward on General Motors.

Fuel Injection Pumps-American-Bosch on the 300 hp.: Scintilla-Bendix on the 640 hp.; Bosch on the Buda.

Air Compressor-Quincy Compressor Company. Air Intake Filter-Silencer-Burgess Manning Co. on 300 hp. and 640 hp.; United Air Cleaner on

Exhaust Silencer-Maxim Silencer Co.-all engines. Lube Oil Pressure Alarm-Detroit Lubricator Co. Lube Oil Purifier-Honan Crane Corporation.

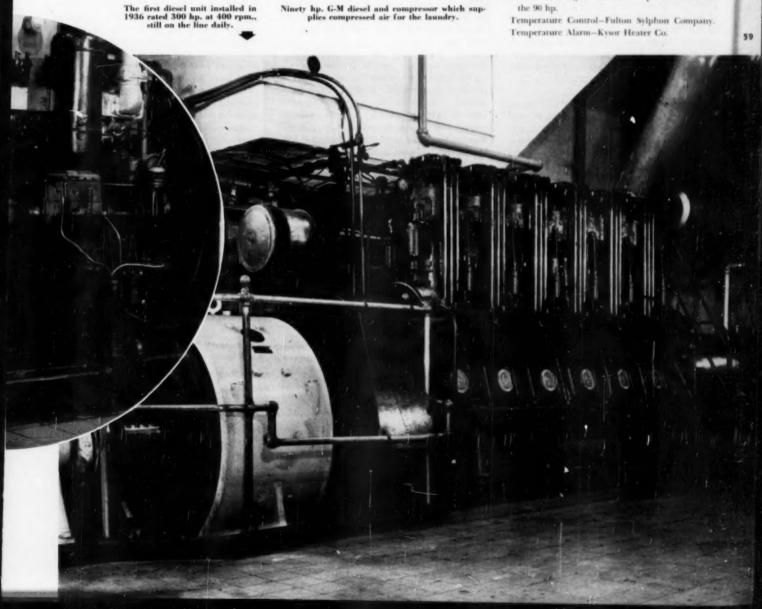
Compressed Air Bottles-Diesel Plant Specialties Heat Exchanger-Ross on the 300 hp. and 640 hp.; Harrison on the 90 hp.

Starting Motor and Generator-Leece-Neville on 60 hp.; Delco on the 90 hp.

Lube Filter-Deluxe Products on the 60 hp.

Fuel Filter-Nugent on the 60 hp.; Purolator on the 90 hp.

Temperature Control-Fulton Sylphon Company.



DIESELS IN A COAL TOWN

Freeburg, III., Solves Multiple Problems with Two 690 hp. Superior Dual Fuel Diesel Engines, Saves \$20,000 a Year on Fuel Bill Alone

By DWIGHT ROBISON

TWO-ENGINE diesel plant is teaching the people of Freeburg, Ill., new concepts of power production economy, with savings of nearly \$20,000,00 a year in the fuel bill alone. The anticipated advent of natural gas will increase fuel savings another \$10,000.00, for these prime movers are Superior dual-fuel engines. By experience and inclination, this community of 2,000 population twenty-five miles southeast of St. Louis is a coalburning town. Nearby coal mines provide a livelihood for a great many of the residents. Since 1903, power and light have been supplied by a succession of steam engines, the latest of which was installed in 1936. But economic realities can be a powerful force for change, and growing deficits convinced the municipality that the steam plant was a liability and that a more efficient power plant had to be provided if rates were to be maintained.

A number of problems influenced the choice of engines. For one thing, the city wanted to keep capital expenditures down by using the old building to house the new equipment. Yet it was necessary to keep the steam plant operating until the diesels were ready. A two-engine plant was indicated. Also, Freeburg engineers had seen how rapidly other municipal plants outgrew small en-

gines tailored too closely to current load conditions, and it was determined to purchase larger units with good efficiency at partial loads. Oil was the best available fuel but a supply of natural gas was expected and it was obviously wise to provide for eventual use of the more economical fuel. The engines chosen were two identical turbocharged, dual-fuel Superior diesels of six cylinders, 12-inch bore and 15-inch stroke, rated at 690 hp. at 450 rpm. Each drives directly a 485 kw., three-phase, 60-cycle, 2400-volt generator with 10 kw. V-belted exciter. The engines now run on oil, but when the gas line reaches the plant it will be necessary only to push a button to switch over to operation on natural gas.

The diesels were fitted into the plant without disrupting service and took over the full load in December, 1948, after which the steam plant was dismantled. The first nine full months demonstrated both the operating efficiency and the economic soundness of the new equipment. Table I shows monthly figures on kilowatt-hours generated, gallons of fuel consumed, gallons of lube consumed and kilowatt-hours per gallon of fuel. In nine months (the latest figures available at this writing) the diesels produced 1,331,760 kwh. while consum-

ing 108,580 gals. of fuel; an average of 12.6 kwh. per gallon. The notable fact is that this efficiency level was achieved with an average load of less than 40 per cent. For example, on October 11, 1949, the load varied between a low of 110 kw. and a peak of 330 kw. Yet fuel consumption was kept down to levels considered satisfactory in many plants with far more favorable load factor.

The economic improvement achieved through installation of the diesels is strikingly clear in Table II. which compares receipts and expenditures of the Freeburg electric department for the first nine months of 1949 with the corresponding peiod of 1948. While production was increased from 996,600 kwh. in 1948 to 1,331,760 kwh. in 1949, expenses were actually reduced by \$7,501.75. With the augmented revenue and the production economy, a loss of \$6,211.64 in the first three quarters of 1948 was translated into a net operating profit of \$14,111.25 in the like period of 1949. It should be noted that the expenditures listed include the generating plant, the distribution system and the business office.

A comparison of fuel costs is of particular interest. For the periods considered, the cost of coal was \$0.0192 per kwh. The cost of diesel fuel was \$0.0081 per kwh., a saving of \$0.0111 per kwh. Natural gas should bring the fuel cost per kwh. to less than \$0.003. Further, the load is increasing steadily and improved load factor will mean greater engine efficiency and greater fuel economy. Use of the old steam plant building forced some sacrifice in appearance, but 'there have been no compromises on equipment quality. From the heavy-duty prive movers down to the smallest piece of auxiliary equipment, this plant is designed for long, efficient. trouble-free service.

A detergent-type lubricating oil is purified continuously in a four-element cellulose cartridge filter for each engine. During engine operation, oil is

Exhaust side of the two Superior dual-fuel engines installed at Freeburg showing the Elliott-Buchi turbochargers, also Elliott generators.

Air Maze air filters and Maxim exhaust silencer at Freeburg, Illinois, extended to outside of the oil power plant.



drawn from the pressure side of the engine lube pump through the filter and into the sump tank. When the engine is not in service, a small motor-driven pump takes oil from the sump, puts it through the filter and back to the sump. Included in the lube oil system are two shell-and-tube oil, coolers. Diesel fuel is passed through cellulose filters also before reaching the engines. The fuel is delivered from tank trucks into a 15,000-gal. tank and then is pumped through meters and the two-element cellulose filters into two 250-gal. elevated day tanks inside the plant. Flow to the engines from the day tanks is by gravity.

Air for the engines is drawn through two-element viscous-impingement type filters outside the building and is sent to the cylinders under pressure by the exhaust-driven turbocharger. Exhaust gases then vent through vertical silencers outside. Principal elements in the closed cooling system are two evaporative coolers and two motor-driven centrifugal circulating pumps. Thermostatically-con-

Table I.—Operating Picture for 9 Months of 1949

1949	Kw. Hr. Generated	Gallons Fuel		Kwh. per Gal. Fuel
Jan.	155,650	12,700	152	12.65
Feb.	139,660	11,060	136	12.62
Mar.	150,330	12.240	206	12.28
April	139,920	11,555	175	12.11
May	138,070	11,450	183	12.06
June	143,430	11,760	126	12.19
July	155,800	12,680	134	12.28
Aug.	157,450	12,725	168	12.38
Sept.	151,450	12,410	157	12.21
9-Month Total	1,331,760	108,580	1,437	12.26

trolled shutters on the coolers keep jacket water at specified temperature. Normally one cooler and one pump are used for each engine but the piping permits alternate or combined use of pumps and coolers. City water is treated in a softener before it is used for makeup.

Beside each engine is a control panel with exhaust pyrometer and alarms on engine lube pressure, turbocharger lube pressure, jacket water temperature, and overspeed. On the engine itself are additional gauges and a tachometer. Distribution is still handled from the old switchboard, but two new engine panels and a swinging synchronizer panel were installed with the diesels. The modernization program calls for replacement of the old board.

Starting air is supplied by two compressors, one driven by motor, the other by a gasoline engine. The first is controlled automatically to keep 200 to 240 psi, pressure in the air tanks. The plant is operated under the immediate supervision of

Table II.—Receipts and Expenditures, Freeburg Electric Department

	First 9 Mos. 1949	First 9 Mos. 1948
Receipts	.\$47,701.84	\$34,880.70
Salaries	9,645.00	10,860.15
Additional Labor	152.55	791.10
Fuel	10,841.63	19,169.89
Lube, Supplies, Maint.	6,534.54	5,419.05
Meter Refunds	445.00	510.00
Sales Tax	1,207.99	1,016.49
Miscellaneous	4,765.88	3.325.66
Total Expenditures	. 33,590.59	41,092.34
Net Oper. Profit	. 14,111.25*	6,211.64†
* Profit. † Lo	DIESEL oss.	STEAM

Cornelius Nold, Superintendent of the Light, Water and Sewage Department. Major policy matters are determined in consultation with Village President Louis M. Schwalb and the six-man Board of Trustees. The business office is managed by Village Clerk Robert Browning.

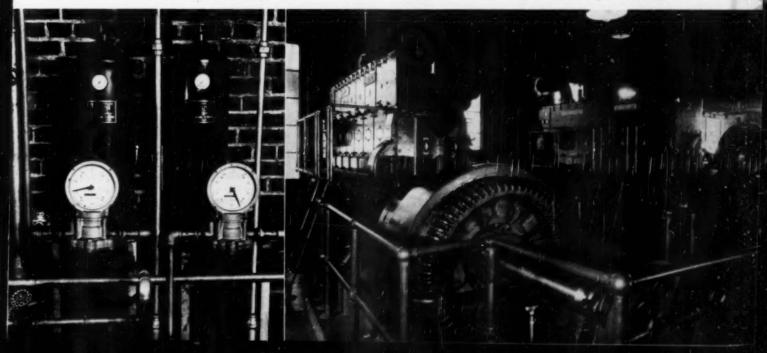
Normal operating procedure is to run one engine for a full week, then switch to the other for a week. The reserve engine provides complete standby protection. The engines are large enough to allow for substantial load expansion and there is room in the plant for additional units when the need arises. Despite the initial unfavorable load factor, Freeburg's diesels have proven their value to the community. Every forseeable change in the present situation will enbance that value.

List of Equipment Air Compressors: Quincy Compressor

Air Filters: Air-Maze Corp. Control Panels: The National Supply Co. Engines: The National Supply Co.; Superior Engine Division. Evaporative Coolers: Marlo. Exhaust Pyrometer: Alnor. Exhaust Silencers: Maxim Silencer Co. Fuel Filters: The Hilliard Corp. Fuel Meters: Buffalo Meter Co. Fuel Oil: Standard Oil Co. of Ind. Generators: Elliott Company. Governors: Woodward Governor Co. Level Gauges: Rochester Mfg. Co. Lube Filters: The Hilliard Corp. Lube Oil: Standard Oil Co. of Ind. Oil Coolers: Ross Heater & Mfg. Co. Switchboard: Lake Shore Electric. Thermostatic Controls: R. S. Products Corp. Transfer Pump: Geo. D. Roper Co. Turbochargers: Elliott-Buchi. Unloading Pump: Gorman. Voltage Regulators: Burlington Instrument Co. Water Pumps: Ingersoll-Rand Co.

A pair of Hilco-Hyflow oil filters installed at the Freeburg, Illinois, plant, Buffalo fuel oil meters in foreground. A pair of 690 hp. Superior dual-fuel engines, operating at the present time on diese oil, installed in the Freeburg, Illinois, Municipal Power Plant.

Water Softener: Elgin.





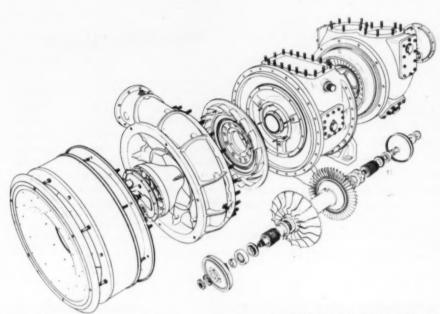
HAT'S GOING ON IN ENGLAND

CONDUCTED BY HAMISH FERGUSON

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

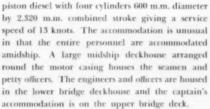
N shipping circles the emphasis is now on the building of tankers and cargo vessels, the programme of passenger vessel replacement being largely completed. The trend continues to be towards diesel rather than steam and of the total gross tonnage of ships over 100 tons completed during 1949, 820,279 tons represent motor ships compared with 533,071 tons for steamers. During the last three months of 1949 building was commenced on over 200,000 gross tons of ships, of which 84 percent will be motor ships. Whereas the diesel tanker is increasingly favored in the United Kingdom the tendency is towards steam in the U.S.A. Among new motor ships recently completed are the following: Ternoy, a 12,000-ton motor tanker, which is the latest of a series being built by Harland and Wolff, Belfast, for Olaf Boe & Co. of Arendal, Norway. Length 487 ft. 6 ins., breadth 59 ft., and depth 34 ft. 10 ins., the single screw propelling machinery consists of a Harland-B & W single-acting, four-stroke diesel, having six cylinder, 740 m.m. dia. by 1,500 m.m. stroke working on the under-piston system of pressure induction. Propeller speed is 115 rpm. Distilled water is used for engine cooling.

Polamhall, a single screw cargo vessel of 9,220 tons built by William Doxford & Sons, Ltd., Sunderland, for the West Hartlepool Steam Navigation Co, Ltd. Dimensions are 447 ft. 9 ins. length. 57 ft. 9 ins. breadth, 28 ft. 6 ins. depth. The propelling machinery consists of a Doxford opposed-



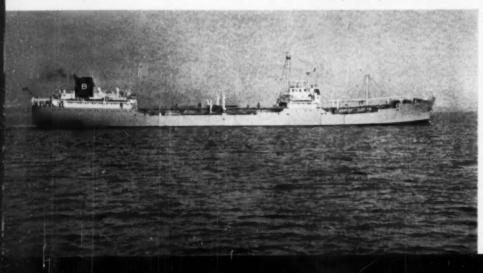
Exploded view of the Napier Turbo-blower.

Diesel Ship Ternoy powered with Harland-B & W four-cycle six-cylinder diesel.

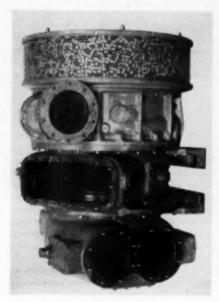


Solor—Ten 24,800-ton tankers of this class are being built by the Furness S.B. Co., and this vessel has been chartered by the Anglo-Saxon Petroleum Co. Her main engine is a six-cylinder N.E.M.-Doxford opposed-piston diesel with cylinder bore 670 m.m. and a combined stroke of 2,320 m.m. to give a ship speed of 14 knots. Her length is 560 ft., breadth 80 ft. and depth 52 ft. 3 ins.

Since the development of turbo-blowers has hitherto rested in the hands of a comparatively small number of manufacturers it is of interest to welcome a newcomer in the field. D. Napier & Son

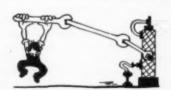


Ltd., of Acton, London, have been continuously engaged in the production of high-quality precision machinery since the year 1808. The Napier car will be remembered in the early 1900's and during World War I their aero-engine was one of the most widely used by the Royal Flying Corps., subsequently to become the Royal Air Force. Again, during World War II, Napiers were in the first flight, and among the first to develop the jetpropulsion turbine. This latter development provided the background and experience necessary for the design of the turbo-blower. The "exploded" view is self-explanatory and illustrates the static and rotary components. A useful feature in the design is the full interchangeability of a wide range of turbine wheels and standard casings, enabling a blower to be selected for optimum matching with a particular engine type.



Napier Turbo-blower.

Regarding materials, the turbine inlet and outlet casings are made from "Mechanite" and the compressor casings are cast in aluminum alloy. The rotor assembly consists of a solid steel shaft with a bladed turbine wheel mounted at one end and a centrifugal air impeller at the other. The turbine blades are made from special heat-resisting materials and the impeller is an aluminum alloy forging, the rotor shaft is carried in two resiliently mounted high-speed bearings, the small axial thrust being taken at the compressor bearing while the other end is free to expand. Both inlet and outlet turbine casings are water cooled and lubrication to the bearings is provided by a separate pump to each. Four standard sizes are available to suit engines having naturally aspired ratings between 180 and 1,400 b.h.p.



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gh-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

ALTITUDE OPERATION

N the October issue of Diesel Progress the write discussed the smoke problem and mentioned that it need not be a problem if engines are properly adjusted and kept in good mechanical condition.

There are any number of fleet operators who are definitely smoke conscious and do everything that can be done to keep their trucks in good shape. One large fleet owner even appealed to the muffler manufacturer. He told him that he had excessive smoke, valves were burning, valve seats were not standing up, his mufflers and muffler pipes were burning out and the exhaust system in some cases was reaching temperatures as high as 1500° to 1600° Fahrenheit. He thought possibly it was back pressure and wanted the muffler man to do something with the muffler. The fleet was in intercity operation and they were carrying heavy loads. The route over which most of the trucks giving trouble traveled did reach some real high altitudes and, as usual, they had a pretty fast schedule to meet. meaning continuous and maximum horsepower delivery from the engines at elevated speeds. They were, as far as could be determined, very serious about the mechanical condition of the trucks and engines. They used good fuel and never exceeded the fuel pump maximum setting recommended by the engine manufacturer.

With all these things in his favor, still he was having trouble. He wanted to know what could be done to correct them. When analyzing a problem of this kind it is necessary to study the known facts and by a process of elimination come up with an answer. The most basic cause of hot exhaust systems is usually termed "After Burning" of the fuel that travels into the exhaust system. It is the result of incomplete combustion in the combustion chamber. Incomplete combustion may be caused by any number of things such as: low cetane fuel: valve timing; valve bouncing; warped valves, bad valve seats; improper valve and/or valve seat material; bad timing of fuel injection; improper fuel injection pump delivery; poor condition of injectors; lack of good turbulence in the combustion chamber resulting in the fuel not being properly mixed with the available air; too high operating engine speed; improper supercharging: high altitude: excessive fuel injection.

H. G. Smith's background in diesel engineering renders his articles of great interest to those engaged in operation and maintenance of high-speed engines. From the Springfield, Ohio, Technical and Engineering school, he entered the Foox Gas Engine Company, Spring-



gine Company, springfield and later, Springfield Motor Truck. With this experience behind him, he joined Hercules Motors Corporation, where he was chief engineer for many years being with them when their diesel program was started. Executive engineer for Buda during the last ten years, he recently resigned to take up consulting work.

If any one or more of these things exist, trouble can be expected. When this operator reported that he was having temperatures in the exhaust system as high as 1600°, it was sure that he was getting raw unburned fuel in it, because you cannot obtain such temperatures without burning something. and that something in this case was fuel. The fire that was occurring in the combustion chamber was incomplete, resulting in the delivery of a mixture of fuel and air (unburned) into the exhaust system. The flame in the chamber was not "quenched" before the exhaust valve was lifted from its seat and when the valve was opened it continued across the valve and valve seat, burning them, and on out into the exhaust system. At high altitudes this is quite a common thing because the air becomes lighter and has less oxygen per cubic foot, but the amount of fuel injected remains constant. When this happens there is not enough oxygen to burn the fuel. In the average supercharged engine this may happen because most engines are designed and tested at approximately sea level barometer pressure. The power output and rated horsepower delivery is determined by increasing the fuel up to the point where additional air delivered by the supercharger is used up, or, saving it another way. the fuel air ratio of supercharged engines at sea level is practically the same as that of natural aspirated engines.

This means that when supercharged engines are set to their maximum fuel stop they will run out of excess air at higher altitudes the same as a natural aspirated engine, not to the same extent, but it is a condition that is prevalent. Assuming that in this particular instance all of the mechanical adjustments and parts are in good condition and that the fuel and lubricating oils are of the proper grade, the trouble is definitely in the amount of fuel being injected for the available air. By lowering the maximum fuel, the combustion will be more complete and after burning cannot take place. Doing this may or may not reduce the horsepower output. Engines deliver their best power when the fuel to air ratio is the best. Excessive or not enough fuel will lower the horsepower. The unfortunate situation in the above case is the variable altitude in which these trucks must operate. By lowering the fuel for altitude for good operation the mixture was too low for sea level operation. The only compromise that can be made is to accept the lower rating. This is a bad thing to decide upon because once the engine is rated and put into the hands of the operator, the maximum power is always expected and needed. Very little trouble is experienced if the variation in altitude does not exceed 3,000 feet, when you go beyond this limit is when things begin to happen. It is also true that with the proper fuel setting high altitudes are not a great problem providing the equipment is operated at such altitudes and not brought down to lower or up to higher altitudes. If the change is too great a loss of power must be expected unless proper adjustments are made to suit the change in altitude.

This problem is far from being localized to diesel engines, in fact, they actually can stand more than gasoline engines. Gasoline engines are affected in the same way as diesels, air compressors lose their efficiency just the same as any machine that needs to breathe. It is all because of the lighter weight of the air. The aeroplane engine does a magnificent job. They have a very expensive and complicated mechanism to vary the air pressure going into the engine, but it is also true that aeroplane engines have quite a reserve power that is not used continuously in ordinary flights. The whole problem resolves itself into an economic one. If more reserve was left in the engine that is not used except for altitude work, the situation would be different.



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CONDUCTED BY R. L. GREGORY

Supervisory Problems in Diesel Plant Operations

N the February issue of Diesel Progress, the writer started a series of discussions on Supervisory problems, many of which have come to us from our readers. We were discussing the subject of cutting plant costs and the various means of so doing, and had gotten to the point of discussing personnel, and how they can function to the best advantage in this all important job.

Much can be said on the subject of the operating personnel's position in the program of lowering plant costs. One of the prime requisites of good plant operation is the periodical inspection of equipment and the proper logging of this routine inspection. Some supervisors have the operating personnel make inspections every half hour, others prefer it to be made hourly. Personally the writer feels that an hourly inspection and log is sufficient, unless some irregularity is noted which may demand more frequent attendance. Figures 1 and 2 show operators making these inspections, the operator in Figure 1 is checking the cooling water on one of the main blower motor bearings, while the one in Figure 2, is checking one of the lubricators and fuel pumps. Most plants operating two or more units have at least two men in attendance at all times, except possibly for short periods. In taking these hourly readings and making inspections it is a good idea to have the operators, or the operator and oiler alternate on the inspections and logging of the same. The purpose of this is that one can check the other and should either of them

overlook some item, the second inspection invariably catches the oversight.

Maintenance and keeping it at a minimum is the vital factor in keeping plant costs down, that is maintenance that is carried on in a sound manner. not just hit and miss, as long as units are kept in operation. The personnel on the regular maintenance crew should be well versed in the mechanical construction of the unit, but the operators who are supposed to know the whys and wherefores of operation can very often be of great help in maintenance work. Let me just cite a case history on how operators and maintenance men can work together to accomplish satisfactory maintenance and cut outage time. One of the jobs of our operating personnel is to take weekly cards from each engine. This is done between inspection periods and these cards are generally taken on Wednesday or Thursday of each week. After the cards have been properly taken, the operating personnel, along with the supervisor, check them carefully, and from their findings they decide just what is to be done in the way of maintenance over the week end, most of which is done on Saturday and Sunday, when the load demand is lightest and the units can be spared for maintenance work. These indicator cards are filed weekly along with a report on just what the inspection showed, what maintenance work was accomplished and the materials used and time spent in making the repairs. This information is filed in a regular maintenance log,

as well as in a space provided for it on the daily log. The operators make their notations on the daily log, while the supervisor logs the maintenance record. In this manner one can be checked against the other without fear of errors.

Suppose that we find two cylinders in which the firing pressure or the combustion readings are below what they should be in normal unit operation, this of course being determined from the indicator cards. The supervisor then arranges his operating schedule for the week-end, so that this unit can be out of service. On Friday, the operators in their time between hourly inspections collect the necessary tools, rigging and equipment for dismantling, spread sheets of presswood on the floors, sheets that we keep for that particular purpose to prevent damage and oil getting on the floors, and get in readiness for the maintenance work. If the operators are preoccupied with other duties, a couple of maintenance men are taken from other work and they perform these duties.

Friday evening after the load has dropped to a point where the unit is not needed, the operators on shift take it out of service, cool it down to a suitable degree, and when it has reached this point, the cooling agent is drained to a point below the cylinder heads. The operators then loosen the cylinder head nuts, remove all attendant piping to the heads on the cylinders in question, lift the heads and lower them on the press wood

Fig. 1

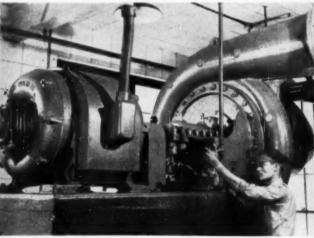


Fig. 2

sheets on the operating floor, using the electric operated crane. Then the unit stands until morning, when, with the assistance of the maintenance crew, they continue to dismantle the unit by removing the inspection doors, unbolting the piston from the cross head and pull the two pistons to be inspected. These pistons are also placed on the mats on the operating floor. The maintenance crew clean the pistons, check the cylinder heads, clean the liners and ports, inspect the wiper ring assemblies, check the flow from the lubricators, install new piston rings on the pistons, check the connecting rod bolts, crosshead pins and bushings and other necessary tolerances.

While they are attending to these duties, the operators remove the fuel nozzles and atomizing equipment and reinstall them in their respective heads. The timing of these various operations, with operating personnel and maintenance men working each on their respective jobs, usually results in all work being consummated at approximately the same time, unless something out of the ordinary arises, in which event they all pitch in and tackle the job. For instance, you will occasionally run into a cylinder head which shows signs of cracking and which should be replaced as a matter of safety. This of course means stripping the cylinder head of all equipment such as fuel injection parts, starting heads, etc., and installing it on a new cylinder head. When this is accomplished they reassemble the unit, with the operators working on the cylinder head and accessories while the maintenance crew tighten the piston on the cross head, lace up the bolts, replace the inspection doors, etc. When all is in readiness, the operators fill the cooling system and put the unit in operation for a period of from 15 to 30 minutes, check it, and assure themselves that all is in readiness when it is next required for service, which is generally on Monday.

Supervisors using this method of cooperation between operating personnel and the maintenance crew, giving each man individual responsibility to carry out their respective tasks in maintenance, will find, once that they get the system organized and time saved, a cut in costs. There is always another advantage in cooperative work of this type, and that is the educational side of the job. The operator looks at the job from an operating view point while the maintenance man looks at it from the mechanical side. Working side by side, they exchange ideas on matters in question, with the result that you usually have a pretty well defined and carried out maintenance job when completed. The foregoing are some of the pointers which might help our friend on cutting plant costs. There are many other factors, but in most cases they become problems of that individual plant, problems which cannot be answered in generalities, such as the above suggestions are:

In our next issue we will discuss the subject of "Safety Methods as Applied to Diesel Operation." In the past few months we have had several communications on the above subject and the writer feels that it is one of vital importance to supervisors of diesel plants. Figure it at

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SOUTHERN PACIFIC CUTS DIESEL LUBE COSTS

By FRED M. BURT

THE legend on the front of the new building says "Southern Pacific Lines Test Department Laboratory—Los Angeles Branch." It is conveniently close to the new Diesel Shop and to the "Quick Turn" track. In operation since April, 1947, this laboratory's present operations cost about \$2,700 monthly while effecting savings conservatively estimated at \$35,000; largely through not making diesel lube oil changes until lab tests indicate the advisability.

The 35 freight and 6 passenger EMD, 6,000-hp main line diesel locomotives, and 42 EMD and Baldwin, 1,000 and 1,500-hp branch line and switcher diesels currently use about 25,000 gallons of RPM Delo 40 (Standard Oil of California) crankcase lubricating oil monthly, plus about 8,000 gallons re-refined.

Every time one of the main line locomotives comes in, whether from a trip of but a few miles, or from a 3,000-mile run, when it goes to the "quick turn" track for a trip servicing or into the shop for one of the regular scheduled maintenance operations, a lube oil sample is taken from the crankcase of each diesel engine. A small suction pump is used to fill standard sample bottles.

These samples are immediately tested for percentage of dilution. If it is up to 2½% the oil must be changed. The tests are made within 20 minutes as trip servicings are completed within an average of 35 minutes.

Without using the dilution and other tests to determine the actual condition of the oil in each engine, following the recommendation of the diesel engine manufacturer, the oil would be changed every 25,000 miles of travel in freight engines, 50,000 miles-passenger diesels. This would greatly increase the quantities of oil withdrawn and pumped into the 22,000-gallon underground used oil storage tank, for subsequent re-refining. Also the labor involves scrubbing out the interior of each tank (265 gallons capacity each freight diesel engine, or a total of 1,060 gallons in the four 1,500-hp. units in each locomotive; 200 gallons in each of the six 1,000-hp. engines in the three car passenger locomotive).

It is calculated that about \$260 monthly is saved on each freight locomotive, and \$600 on the passengers, through extension of lube oil life. The average mileage between changes on the freight units is nearly up to 100,000 miles, but often running to 150,000 miles; on the passengers around 300,000-325,000 mile average but often up to 400,000 miles, when scheduled overhaul requires oil change in spite of its condition. Other scheduled and special work cuts down the freight mileage average, between changes.

The dilution is tested with a Kinematic viscosimeter which can handle eight simultaneous tests. For each test 5 ml. of the oil is poured in at the top to run down into a glass tube immersed in a constant temperature bath (held at 100°F.). The oil is held here for 10 minutes to bring it up to temperature. It is then sucked over into a vertical capillary tube by vacuum actuation, and then down for a U-turn and up in a calibrated tube. Using a precision "Time-It," manual timer, the time it takes to rise from one calibration point to another is recorded. This gives the "kinematic viscosity" and from it the per cent dilution is calculated from the chart. This viscosity curve was developed by testing a large number of new oil samples made up with from 0% to 25% fuel

The re-refining installation is in the new diesel shop basement. On one side there are five tanks for (1) used lube oil (drawn from the 22,000-gallon tank through a pump-piping system in 1,000-gallon batches), (2) rejected re-refined oil (not passing lab tests and requiring another re-refining), (3) accepted refined lube, (4, 5) extra storage tanks, all of the tanks inter-connected.

A sample of the used oil goes to the lab for a dilution test. An 80-gallon batch is pumped into the retort (a large boiler) held at 26 inches vacuum, and is there kept for three hours at a controlled temperature (about 600°F.) which distills off all fuel oil and water. Then to the acid neutralizing tank (pure dry lime administered and agitated). A diatomaceous earth is added to provide flowability in filtering. This mixture is pumped to a plate and frame filter press to filter out all contaminants and clay additives. The end product is a mixture of pure hydro-carbons. Then another sample goes to the lab for exhaustive tests. There is an average loss of 10 gallons out of each 80 gallons processed and two such batches are re-refined each eight hour day. The balance of the used oil is re-refined by an outside contractor, using the same processes and under the same lab control.

The first sample is given the following tests in about an hour's time. The results are interpreted to order in a manner that enables advices to be given the operator; such as to the time/temperature factor in the retort, the quantity of re-agents to use in the acid neutralization. (a) the viscosity (dilution) test; (b) moisture determination; (c) centrifuge to find the per cent of sludge; (d) acid test in burettes, with close control of re-agents.

The used oil after re-refining is a good base oil but through use and re-refining has lost certain of its additive values. The additives that have contributed such qualities as detergency (to prevent ring and valve sticking and gum formation); oxidation inhibition; de-foamer (to prevent excessive crankcase foaming); anti-rust; and "oiliness" (a quality hard to define other than to say a maintenance of high lubrication efficiency). Such additives are necessary for lubricating these diesel engines as the temperatures and pressures are too great for straight lube oils.

The re-refined oil must have the indicated quantity of additives administered before it can be used again. These are administered in a single combination.

The new oil has a rated flash point of 465°F. with a 440° minimum, and the re-refined oil must come up to this standard; in fact, up to the standard of new oil in every respect, before it can be put into use. For this and other flash-testing, the Pensky-Martens (up to 250°) and Cleveland open cup (above 250°), flash tests are used.

The branch line and switcher diesels are checked monthly for crankcase lubricant dilution. (At all times when any of the oil is given this test it is also given a careful visual examination for contamination.) Oil samples from these engines, and from the main line engines at the 10,000 mile scheduled maintenance (generally), also when a visual examination or other circumstance indicate the need, are also given tests for ash content, percentage of weight of residue after complete combustion of inflammables in oil; precipitation (of contaminants in centrifuge—gum, metals, resin, water, etc.); acid number or determination of lube oil acidity through titration against neutralizing reagents in a burette; and flash point.

The Stectrograph is used to provide a rapid de-

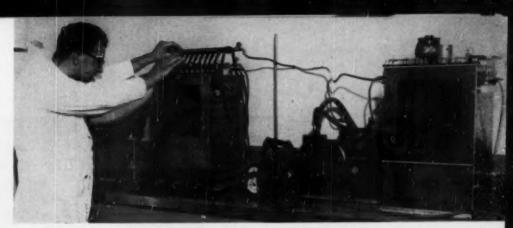
termination of the additives in the standard, new lube oil. Then test oil from the engines (main line) at each 10,000 mile maintenance servicing is checked to see if the additive level above a safe minimum is being maintained. The Spectrograph also shows how much foreign material is in the oil—such as metal from cylinder wall wear; copper-lead from bearing surfaces, an excess showing probable rapid deterioration of the crankshaft bearings; silver from wrist-pin bearing to indicate incipient failure; chromium from treated water (for rust inhibition) to indicate water leaks. Even though the water evaporates from the lube oil it leaves chrome salts as a residue.

In the spectrograph, an 8-ml oil sample is placed in a cup-shaped tray. A wheel of spectrographically pure carbon dips in the oil and carries it up into an arc formed between the carbon wheel (as the lower electrode), and a pointed carbon rod (as the upper electrode). In the arc all of the elements are excited to emit characteristic spectra. The light from the arc passes through a very narrow slit (about 1/700,000-inch), and across to impinge upon a metal grating. Ruled 24,000 lines to the inch, this diffraction grating splits the light to be thrown out, reflected as a cone.

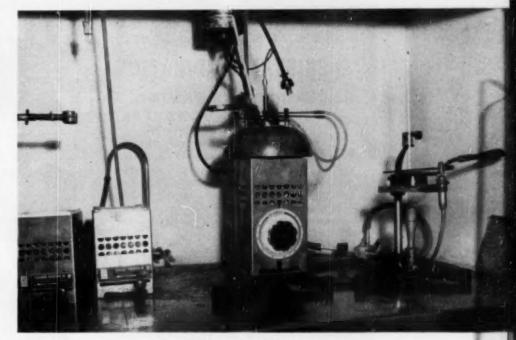
This cone bears on a photographic film with each element emitting a light of characteristic wave length (in Angstrom units) with each registering on the film as identifiable bands. The developed film is projected by a comparator densitometer in which the registered wave lengths are identified and compared with a master plate to determine the quantities of each element that are present.

In addition to the petroleum and spectrograph laboratories, the building also contains an analytical laboratory. Every time a lube sample is taken from an engine in a 100 cc sample bottle (cover off of sump box, then using suction pump—freight engines; cover off Michiana filter box and dip out oil—passenger), a sample bottle of cooling water is drawn off from a small stop cock. These are analyzed for remaining quantity of chromate rust inhibitor so that advice can be rendered as to the amount to be added.

This is an outline of the main operations in this laboratory. In addition to specified routine testing, with the many and diverse facilities, imagination and common sense dictate interim, additional and special tests which are constantly adding to the knowledge of the condition of every engine. Also leading to ways and means of cutting lube operating and maintenance costs. Assistant Chief Chemist, C. C. (Cliff) Mugford, in charge of the lab, and his four chemists, in a 24-hour daily, seven day-a-week, operation have come to know constantly, vagaries, tendencies, and incipient weak points of each engine. This enables them to work in close cooperation to assist key personnel of the diesel shop in keeping the locomotives in prime operating condition. The laborator comes under the jurisdiction of Superintendent of Motive Power, Southern Division, E. D. Hinchman, at Los Angeles, and General Superintendent of Motive Power, B. M. Brown, San Francisco. through P. V. Gavin, Engineer of Tests.



Assistant Chief Chemist Cliff Mugford making kinematic viscosity test for lube oil dilution percentage. Note six timers in front. At right is second viscosimeter, operating at 210° constant temperature and used in conjunction with the other unit to determine the viscosity index of any lube oil.



At left, two heaters; center, Pensky-Martens Flash Tester; and right, Cleveland Open Cup Flash Tester.

Projection, with comparator densitometer, of lube oil sample Spectrograph film showing (upper section) characteristic wave lengths of clements contained therein, for comparison with Master Plate below to determine quantities.

Analytical lab with Chemist W. F. Ganther testing cooling water sample for chromate inhibitor content, also water hardness.





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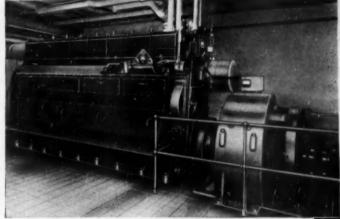
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Night view of the Royal American Shows. Power and lights supplied by ten Caterpillar diesel generating plants.

Royal American Shows midway with wagon on which one of the ten diesel generating sets is mounted.

Naturally they bought a second CP Diesel



New 640 H.P., 720 R.P.M. CP Diesel Engine driving a 425 kilowatt DC Generator at the Cascade Laundry of General Linen and Supply Company.

Original 300 H.P., 400 R.P.M. CP Diesel Engine driving a 200 kilowatt DC Generator.



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New Fuel Oil Prevents Diesel Freeze-Ups

Recent testings by highway contractors have shown that Suhm Fuel Oil Conditioner added to diesel oil will greatly improve cold weather diesel operation. The action of this oil conditioner makes combustible previously unburned carbons and dissolves resins in the oil. This elimintaes sludge and varnish, gives greater heating efficiency and cleaner burning qualities. Construction officials, knowing of the oil conditioner's success when used in fuel for oil burning boilers and furnaces, decided to try it on their diesel equipment. During these successful tests, it was noticed that equipment powered with the supplemented fuel did not show the usual cold weather freezing tendencies, and engines

responded more readily. This fuel oil conditioner is in liquid form, and should be used in proportions of one quart to 500 gallons, or one pint to 250 gallons. It is manufactured by Suhm Company, Inc., 4701 West Electric Ave., Milwaukee 14, Wis.

Appointment at Aeroquip

Aeroquip Corporation, of Jackson, Michigan, announces that Mr. Byron E. Snow has been appointed sales engineer in the Chicago territory, which embraces Illinois, Iowa and Southeastern Wisconsin. Mr. Snow will service only the manufacturing accounts in that territory. His headquarters will be 380 Elizabeth Drive, Lombard, Illinois.

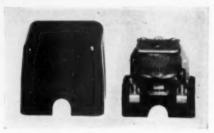
Sales Aid by Sheppard



The R. H. Sheppard Company, of Hanover, Pa., manufacturers of Sheppard diesel tractors and farm implements, is offering its dealer organization new sales aid in the form of a minature model of their SD-3, three-plow tractor. The miniature tractor is reproduced to scale at approximately one-sixteenth size. The model row crop tractor is mounted on rubber wheels and is finished in the standard Sheppard orange with the name and model imprinted in black on the sides of the tractor.

The miniatures are individually boxed in cartons which bear half-tone reproductions of the big tractors and carry the name of the manufacturer. They are available to Sheppard dealers in case lots of twelve tractors.

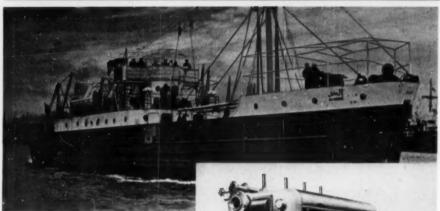
Improved Voltage-Type Accelerating Relay



An improved voltage-type accelerating relay, designed specifically for starting single-phase, capacitor-start, and capacitor-start capacitor-run motors, has been announced by General Electric's Control Divisions. According to engineers, the new relay is particularly applicable where adverse atmospheric conditions exist or where it is desired to have remote control which can be incorporated into an explosion-proof case. The relay will find its most common application in the control of hermetically sealed refrigerator compressor motors. It can be furnished with or without cover, can be wired from top or bottom, and all parts are corrosion resistant. Extensive life tests prove that the relay easily withstands the most severe vibrations encountered in compressor application.

The voltage principle employed eliminates voltage drop at motor terminals usually encountered with current-type relays. Extremely wide differential between pickup and drop-out voltage gives positive operation of the control despite wide variations in line voltage. The relay meets all Underwriters' Laboratories specifications. Contact rating is 50 amperes at 115 volts and 30 amperes at 230 volts. In normal operation, the contact handles startwinding current only.

From Wartime Emergency to Peacetime ECONOMY

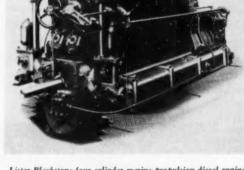


Converted Landing Craft, "Al Akeek" and "Assabir" are owned by Arabian Economy and Thrift Trading Co., Ltd., Jedda, Saudi Arabia.

FROM LANDING CRAFT TO CARGO AND PASSENGER CRAFT—from war load to PAY LOAD—that's the story of an unusual conversion job on 2 L.C.I. (L1's, engineered throughout by Lister-Blackstone, Inc., New York, and their associates of England.

ECONOMICAL, DEPENDABLE POWER was a "must" for profitable pay-load Red Sea passenger and cargo carrying. Hence the installation of two Lister-Blackstone 4 cyl. 144 B.H.P. main propulsion diesels in each vessel. Auxiliary power is furnished by two 40 H.P. four-cylinder Lister-Blackstone engines driving 22 kw. generators, pumps and compressors.

REDUCED PRICES GIVE YOU BEST DIESEL VALUE FOR YOUR DOL-LAR. Main propulsion and auxiliary units, 3 to 320 H.P. Write us your requirements. Address Dept. DP.



Lister-Blackstone four cylinder marine propulsion diesel engine Model EPVM 4, developing 144 H.P. at 600 rpm, continuous rating.



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Atlantic's DOUBLE INSULATED EX-HAUST HOSE . . . WATER JACKETED EXHAUST HOSE . . . SEAMLESS STEEL HOSE Type SW have built an enviable record in controlling vibration and exhaust to the point where maintenance is the "forgotten prob-. All ATLANTIC hose is "Job Tested and Guaranteed to Do Its Job."

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mands of pumps . . . and Brown & Sharpe makes

pumps that fully meet those demands . . . for lubrication, transfer and fuel boosting. They're sturdy, precision-made, compact and powerful. Write for catalog of rotary geared pumps . . with helical, spur and herring-bone gears. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S. A.

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We urge buying through the Distributor

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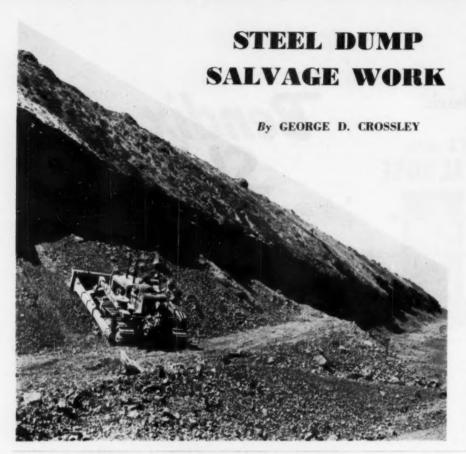
Answer to Any **Filtering Problem**



For over twenty years Bendix-Skinner has spe cialized in solving the filtering problems that "couldn't be done." From this experience has come entirely new and exclusive filtering techniques which do even the work-a-day filtering jobs better and at lower long-range cost. Tell us about your problem—nine times out of ten Bendix-Skinner filters will supply the "finest" onswer.

Over 350 Models providing filtration from 1/3 micron (.000019") upwards at flow rates from 1 to 5000 g.p.m.





The Ninnequa Salvage Dump Company of Pueblo, which is owned by Eugene Untermayer, has a contract with the Colorado Fuel & Iron Corporation to work two huge dumps in which steel and iron are mixed with slag and other refuse. The dumps are an accumulation of years. Each is four miles long, 70 feet high, and a block wide at the top. Use is made of four International diesel crawler tractors in the salvage operations. Three of the tractors are put to work in the openhearth dump. Two of these tractors spread out refuse at the bottom of the open-hearth dump. Another tractor works at the bottom of another dump that has been abandoned and which is called the blast-furnace dump.

Workers trained to spot the pieces of metal follow each tractor. Mr. Untermayer says that these men soon get a certain "feel" for the metal. a sort of magnetic touch, which enables them to sift the steel from the slag. The blast-furnace slag, which contains more lime, sulphur and silica, is poured out while still in liquid form, and when cooled the surface of the dump takes on a vitreouslike appearance where the tractors are working,

Exciting moments for the workers also sometimes occur at the open-hearth dump by "blow-upa" which are caused by gases formed by coal dust from coke-plant "wash-aways" which are dumped with the slag. The slow burning of this coal dust is also evidenced by occasional streaks of smoke coming from various parts of the dump. In recent years, cranes equipped with magnets have been utilized to salvage metal in the slag yard.



Proven Design Increases Safe-Use Life of Oil . . . Cuts Maintenance Costs

Honan-Crane Oil Purifiers are the choice of leading Diesel operators and engineers for purification of lubrication oils in Diesel Engines.

Honan-Crane purifiers remove abrasives, acids, sludges and all other types of damaging contamination . . . give maximum protection against bearing failure . . . extend safe-use life of oil, thereby reducing the need for frequent oil changes. Design characteristics of Honan-Crane Purifiers have been tested thoroughly for many years under all kinds of operating

On-the-job performance has proved that the best saves you most in the long run. Give your diesels the finest protection you can buy . . . specify HONAN-CRANE.

For complete information (or, a Honan-Crane resident engineer will call at your request) . . . write to Honan-Crane, 202 Indianapolis Ave., Lebanon, Indiana.

HONAN-CRANE CORP., Lebanon, Indiana Subsidiary of HOUDAILLE-HERSHEY CORP.

Beekman Crankshaft Alignment Indicator



It is indisputable that in almost every case broken crankshafts are due to faulty alignment. Invariably therefore the expense and inconvenience of such breakdowns could have been avoided by the use of a reliable indicator before the damage was done. The Beekman Crankshaft Alignment Indicator being offered by Diesel Specialties Company, 424 Portage Street, Stevens Point, Wisconsin, "the sturdiest gauge of its kind in the world," is an instrument of extreme precision combined with a sturdiness of construction which enables it to withstand, unimpaired, day-to-day hard shop usage. The Beekman Indicator is suitable for use on all types of diesel, dual-fuel and gasoline engines of any make and the facility with which tests of splithair accuracy can be made is greatly enhanced by the fact that the dial can be read in all positions of the crank. No refitting is required between readings and the accuracy of the test in no way depends on the sense of touch of the operator as when a micrometer, a gauge and feelers are used. The dial of 11/2-inch diameter is graduated in 1/1000ths inch plus or minus 25, and the pacer pieces allow for 214 inches to 18 inches range between webs. The indicator can also be used for checking conrod bearing clearances and checking cylinder liner wear.

This fully guaranteed indicator of English manufacture has proven itself under rigorous service conditions throughout the world. It is in regular use by the British armed forces, dockyards and leading engine manufacturers. The distributors anticipate a keen demand on the United States market for an instrument which combines precision with sturdiness at the current price of \$35.95, complete in mahogany case.

Bodine Named to Central Station Post on Pacific Coast

Frank E. Bodine has been named assistant Central Station manager for the Pacific Coast District of the Westinghouse Electric Corporation, with head-quarters in San Francisco. Former Pacific Coast manager of maintenance sales, Mr. Bodine will serve the company's electric utility customers throughout the Pacific Coast District in his new capacity. A native of Denver, Colo., Mr. Bodine joined Westinghouse in 1926, and in 1928 he was transferred to the Salt Lake City office as a salesman and in 1941 was named sales manager there.

Consolidation of All Canadian Subsidiaries

American Brake Shoe Company announces the consolidation of all operations of its Canadian subsidiaries into one corporation, the Dominion Brake Shoe Company, Ltd., a wholly owned subsidiary. The operating assets and business of Joliette Steel Limited and Ramapo of Canada, Ltd., were acquired by Dominion Brake Shoe Company, Ltd. With this consolidation, Dominion Brake Shoe will operate all of the Canadian plants of the parent company through five divisions. These operating

divisions will be the Brake Shoe Division, Joliette Steel Division, Canadian Ramapo Division, American Brakeblok Division, and Kellogg Division.

Dominion Brake Shoe Company, Ltd., will make its principal office at 1405 Peel Street, Montreal, P. Q., Canada. It will continue to operate plants located at Lindsay, Niagara Falls and St. Thomas, in Ontario, and at Joliette, Quebec. Products of Dominion Brake Shoe Company, Ltd., include brake shoes, track equipment, manganese steel castings, automotive brake lining, air compressors and paint spray equipment.



DIESEL & DUAL-FUEL ENGINES



See this and other models at
Grand Central Palace, New York, April 15th-23rd

APPLICATIONS INVITED from firms in the U.S.A. interested in the possible distribution of our range of diesel engines. Stock and Credit Facilities available.

RUSSELL NEWBERY & CO., LTD.
ESSEX WORKS, DAGENHAM, ESSEX, ENGLAND. Cables: Diesel, Dagenham

CANADA-CANADIAN TAIRLANKS NOTICE CO., NOTICE AND BRANCHES ARGENTINE-FIREX SRL. BURNOS TAIRES

STAZIL-LUPORINI COMERCIO E INDUSTRIA EDA. RIO DE LANGITO.

SEE OUR ADVERTISEMENT IN NEXT MONTH'S ISSUE

British Diesels to be Displayed at New York Auto Show

Complete lines of the latest British diesel engines, from small high-speed units to heavy-duty units ranging up to 2,000 hp., will be featured at the British Automobile and Motorcycle Show at Grand Central Palace, New York, April 15-23. Joining with Britain's auto, truck, and bus manufacturers, who will show some 100 different models of a score of different makes, British engine manufacturers have planned a diesel engine display which promises to be one of the outstanding events of the year. Advance word is that the low prices, light weights, and quick delivery now possible with the British

engines will be a surprise to American buyers. The diesels will share the first and mezzanine floors of the huge Palace, site of the great National Automobile Shows of former years, with motor cars, truck and bus displays; accessories, garage equipment, motorcycles and bicycles will also be exhibited in the most complete automotive exhibition to be held in America since the war. Exhibitors are making special plans for United States dealers to view their lines and discuss franchise and dealership arrangements, it is announced. Special representatives of all exhibiting firms will be on hand, with dealers' headquarters set up within the Palace for the convenience of the trade. Britain's automotive industry, it is emphasized, remains one of

that country's greatest private enterprises, operating entirely under private ownership and without government subsidies. The largest exporting industry in Great Britain, it is staging the New York exhibition to show its products to United States dealers and consumers, find and develop new markets, and thus help bridge the "dollar gap" by supplying good products at fair prices.

Notable among the power units which A. E. C. Ltd. is arranging to show at the exhibition will be the new horizontal 6-cylinder, direct-injection diesel engine based upon the company's recently introduced "Regal" Mark IV passenger chassis. This will be the first time that this engine has been shown in any exhibition. The other diesel manufacturers represented at the show will be: Associated British Oil Engines, C. A. V. Ltd., Daimler, Leyland Motors and Russell Newbery and Company, Ltd.

Special Rep.for Railroad Sales



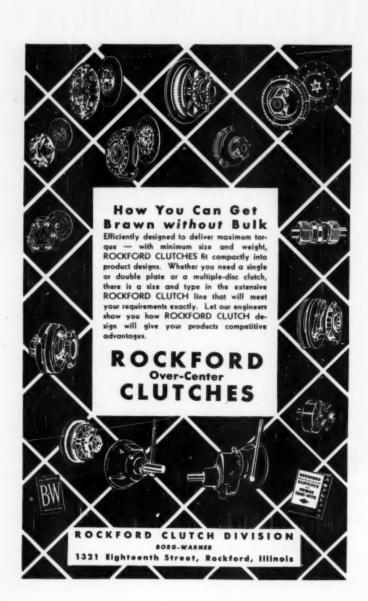
sentative on railroad sales for Caterpillar Tractor Company has been announced by H. H. Howard, director of sales. Hunkele, who has been serving as district representative, eastern sales division, is a native of

The transfer of J. J. Hunkele, Jr., to special repre-

Newark, N. J., and has a background of 11 years' experience in the diesel field. He joined Caterpillar in January, 1947. During the war he served as chief engineer in the Maritime Service, as an engineer in the Marine Transportation Corps, and as a training officer in the Army Air Force.

New Agents for Flexitallic

Realignment of the field organization of the Flexitallic Gasket Company, Camden, N. J., has been virtually completed with the appointment of three new agents and two new distributors. One of the new appointments is for a distributorship for Mexico. This reorganization has been carried out under the direction of Nicholas L. A. Martucci. who became General Manager of the company in 1949. The following are the new agents: The Moorlane Company, Tulsa, Oklahoma, with branches in Kansas City, Amarillo, Denver, Oklahoma City and Wichita; the Boiler Equipment Service Company, 686 Greenwood Ave., N. E., Atlanta, Ga., and will serve Alabama, Florida, Georgia, North Carolina, South Carolina and Tennessee: Lane Machinery Company, Inc., Buder Building, Seventh and Market Streets, St. Louis 1, Mo., serving eastern Missouri, southern Illinois, western Kentucky, western Tennessee and northeastern Arkansas; Plant Equipment, Inc., 607 Sexton Building, Minneapolis 15, Minnesota, and will serve Minnesota, North Dakota, South Dakota, western Wisconsin and northwestern Michigan: Consultores Y Abastecedores Industriales, S.A., Dolores No. 17-301, Mexico City, will serve the Republic of Mexico.



V. P. for Mack



J. V. Doll

J. V. Doll has joined Mack International Motor Truck Corporation as vice president. Fleet sales, and as special assistant to H. W. Dodge, executive vice president. For the past twenty years Mr. Doll has been associated with The Texas Company as manager of its Nation-

al Sales Division. Mr. Doll is one of the pioneers in the automotive field. After the last World War I he joined White Motor Company as a salesman Atlanta and sold the first bus in the south. Later as a member of the executive staff, he organized and headed the White Company's National sales department in Cleveland. Mr. Doll will be making his headquarters at the Empire State Building, New York City.

Regional Manager for Superior



John J. Fetsko

Announcement has been made by Superior Engine Division of The National Supply Company of the appointment of John J. Fetsko, Jr., as regional manager in charge of all inland waterways diesel sales for the division. Mr. Fetsko will make his headquarters at Superior En-

gine Division's office in the Boatman's Bank Building, St. Louis, Mo. Prior to his appointment Mr. Fetsko has been sales engineer for Superior, located in New Orleans. Mr. Fetsko has spent some 21 years in the marine field and has had extensive experience in the testing and operation of diesel engines and steam equipment. He joined the National Supply Company's Superior Engine Division in the fall of 1948.

ABOE's Convention



Ronimund Bissing

With national sales and service representation already effected, and an intensive promotional program under way. Associated British Oil Engines, Inc., New York, organized last October as part of the overall effort to help make American - British trade more self-sustaining,

will make its full-dress debut as a going American concern with a convention of distributors and dealers to be held at the Waldorf-Astoria Hotel April 13-14, it was announced by Ronimund Bissing, company president. Approximately one hundred ABOE distributors and dealers from all parts of the United States are expected at the convention, which will present the company's background, executive personnel, and future operating plans.

The convention has been timed to coincide with the company's participation as an exhibitor at the

forthcoming British Automobile and Motorcycle Show to be held at Grand Central Palace, April 15-23. At the Show, ABOE will present a number of engines, together with models of others too large to exhibit. There will also be photo-murals of the various plants, installations and applications. Alexander C. Geddes, Managing Director of ABOE, Ltd., London, the parent company, and son of Lord Geddes. British Ambassador to the United States from 1919 to 1923, is scheduled to fly here especially to welcome the distributors and to report on the parent company's plans for all-out support of the American organization.

British diesel manufacturers now in the ABOE,

Ltd., group are: Petter, Meadows, Petter-Fielding. McLaren, Mirrlees, and National. All of these manufacturers have long standing reputations for quality of product. Mirrlees is the oldest British diesel producer; its first engine appeared on the market in 1897. Petter has been in the diesel field since 1898.

ABOE, Inc., dealers are mainly dealers for General Motors diesel engines. The distributive structure also includes dealers for Caterpillar and Cummins diesel engines. The British engines being marketed here are for the most part of smaller size than current American diesels, and thus offer little or no competition to domestic products.



For over 25 years (upward of 200,000 hours of engine operation), Fairbanks-Morse diesels have served the municipal power plant at Red Bud, Illinois. In 1924 the first internal combustion engine, a Fairbanks-Morse semi-diesel, was installed. Since then equipment has been added as the needs grew until today five slow speed heavy-duty F. M. diesels serve the town. A higher standard of service and rates at or below levels prevailing in communities of similar size, have continually increased use and attracted new users to this community. On top of that the plant has been able to make substantial cash payments to the town. Needless to say, the availability of power under these conditions has made important contributions to the welfare of this community, Maxim proud to have its silencers doing their usual quiet, efficient job of making life pleasanter for those who live and work near this fine municipal plant.



EXHAUST AND INTAKE SILENCERS

designed to silence the exhaust or intake of internal combustion engines, steam engine exhaust, air compressor intake, vacuum pump discharge and the intake or discharge of blowers.

AIR INDUCTION SILENCERS

The venturi-like ejector at the outlet

permits the outgoing flow of exhaust

gases to draw air from the engine room

and up through the jacket surrounding



SPARK ARRESTOR

. provide effective silencing of exhaust noise plus 100% spark arresting-for use where fire safety is imperative or where dirt nuisa ust be eliminated.



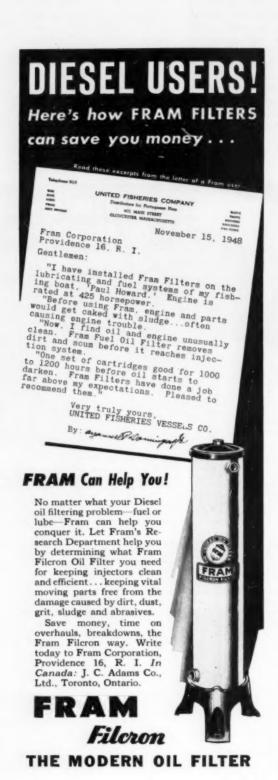
, combining efficient silencing of engine exhaust noise with spark arresting (where nece pary) and with the ethent recovery of waste exhaust heat to produce steam or hot water for heating or processing operations

BULLETINS ON REQUEST



THE MAXIM SILENCER COMPANY 94 HOMESTEAD AVE. HARTFORD, CONNECTICUT

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GENERAL PURPOSE PUMPS

 Low first cost ◆ Negligible maintenance ◆ Compact design ◆ Operates dependably in either direction of rotation ◆ Capacities to 200 g.p.m. ◆ Pressures to 100 p.s.i. ◆ Direct drive, slow-speed V-belt units and stripped models

Write for Madel C bulletin.

739 East 95th Street Chicago 19, Illineis Phone RE 4-7420

Railroad Bearing Lubricant Tester



Development of a new machine for testing railroad car journal-box bearing lubricants is announced by the Beacon, New York, laboratories of The Texas Company. Weighing seven tons, the new tester simulates actual opertaing conditions for railway car bearings and will handle loads up to 50,000 pounds. The tester permits studies of bearing lubrication under shock loading conditions which were previously impossible in the laboratory and is designed to handle both plain and roller bearings. It is anticipated that studies on this machine will point the way to new operating economies, comfort and speed. The apparatus simulates car speeds up to more than 100 miles per hour. It duplicates the steady car loads and shock loads, both vertical and thrust, encountered in actual railroad opera-

The apparatus will accommodate bearings of all manufacturers and is constructed in conformance with American Association of Railroads standards of axle design. It is possible to apply a combined vertical load of 50,000 pounds and an axial load of 15,000 pounds on each of two test journal bearings, one located on each end of the machine. All loading is accomplished hydraulically, and each of the two test bearings can be loaded independently.

Appointment at American Locomotive

Duncan W. Fraser, chairman and president of the American Locomotive Company, announced recently that Erskine W. Manterfield has been appointed director of public relations and advertising for the company.

Mr. Manterfield will replace Holmes Brown, who has resigned to accept appointment on the staff of Colonial Williamsburg, Incorporated, the organization formed by John O. Rockefeller, Jr., to carry forward the restoration of Williamsburg, Virginia. Mr. Brown will be special assistant to Bela W. Norton, executive vice president.

A graduate of the University of Pittsburgh, Mr. Manterfield was associated with Pennsylvania-Central Airlines (now Capital Airlines) from 1937 to 1942, and became assistant director of public relations for that company. After serving four years in the Army, he joined American Locomotive in 1946. He has been in charge of the company's public relations activities for the Alco Products and Railway Steel Spring Divisions, as well as for Alco's Canadian affiliate, Montreal Locomotive Works, Limited. Mr. Brown, a graduate of Iowa State College in 1936, was with the General Electric Company in Schenectady and Bridgeport for seven years. He then joined the Pennsylvania Rub-

ber Company at Jeannette, Pa., as director of advertising and sales promotion. In 1945, he came to American Locomotive as director of advertising, and in 1947 became director of public relations for the company.

Elected to the Board of Directors

Frank P. Herman, executive vice president of Purolator Products, Inc., Newark, New Jersey, manufacturers of automotive oil filters and other filtration equipment, has been elected a member of the board of directors of the company, Ralph R. Layte, president, announced recently. Mr. Herman, who has been with Purolator for 25 years, is a native of Ashland, Ohio, and has been associated with the automotive industry since 1910, when he joined Studebaker at South Bend, Indiana. He joined Purolator in 1927 as manager of the Detroit office, later becoming equipment sales manager of the company. He was elected vice president in 1941, and became executive vice president in 1945.

Diesel Engine Catalog is just off the press in its Fourteenth Edition. See the unique Diesel Horsepower Range Chart — invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 85.



MWM

MANNHEIM DIESEL

A DIESEL ENGINE, manufactured by one of the oldest and most renowned firms in Europe, is now available in the U.S.A.

The MANNHEIM DIESEL, originally designed and developed by Carl Benz, for which the first patent was granted in 1909, has proven its worth for over 40 years in various applications.

Shown are:

Model KD 415Z, 2 Cylinders, 22 H.P., 1500 R.P.M. Weight: 1100 lbs.

Model KD 415D, 3 Cylinders, 33 H.P., 1500 R.P.M. Weight: 1250 lbs.





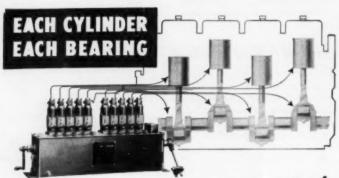


Model KDW 415E, 1 Cylinder, 12 H.P., 1500 R.P.M. Weight: 750 lbs.

Territories Open — Distributors Invited
Other Models for All Purposes Up to 1000 H.P.

FOR FURTHER INFORMATION APPLY TO U.S.A. EXCLUSIVE REPRESENTATIVE:

ERNEST L. FRANKL ASSOCIATES



Individually Lubricated

Y faithfully delivering precise amounts of oil to cylinders, bearings, and other points of friction, Manzel Lubricators save engine owners up to 60% in reduced oil consumption and lowered maintenance costs. Write for further information

Manzel Brothers Co. now supplies repair parts for all models of Bowser and Torrington Lubricate

A Subsidiary of Frantier Industries, Inc.





"I had a cracked cylinder head busted right down the middle. Dr. Guth operated — no pain at all — I feel fine. Ready to start life all over again. Let me tell you if your Diesel engine block cracks open and the case looks hopeless, call in Doc Guth for a prompt surgical welding job."

Note: Actually we don't supply pretty nurses as part of our RENEWAL service everything else comes with the job.



Diesel-Electric Carbon Brush Bulletins

The first of a new series of bulletins dealing with carbon brushes for motors and generators in dieselelectric locomotives is announced by National Carbon Division of Union Carbon and Carbide Corporation. The first bulletin explains the functions and physical properties of carbon brushes and the three primary requirements of a brush discussed under the headings: Conduction of Load Current, Sliding Contact and Commutation. Slip Ring Brushesand Metal-Graphite Brushes are also dis-

The series of bulletins has been planned as a service to those engaged in the operation and maintenance of diesel-electric locomotive equipment. They contain discussions of practical subjects pertaining to brushes and commutation to aid in solving some of the numerous problems associated with brush application. Some of the material has been published previously, but in these bulletins emphasis is given to topics specifically related to the electric equipment used on diesel-electric locomotives. The entire series may be obtained by writing to National Carbon Division. Union Carbideand Carbon Corp., 30 East 42nd St., New York 17, N. Y.

Important Suit Settled

It has been jointly announced by Dr. Alfred J. Buchi, Swiss engineer and inventor, and Baldwin Locomotive Works, that the litigation between them in the United States District Court in Philadelphia had been terminated by agreement. The case, which involved the Buchi System of Diesel Engine Turbocharging, was brought by Baldwin and presented a dispute about patent validity and anti-trust violation. Baldwin signed a modified License Agreement with Dr. Buchi covering the period in dispute and settlement was made thereunder. The court actions of both parties were discontinued.

The Buchi turbocharging system increases the power output of diesel engines by 50 percent and more, and is in use here and abroad in railroad, stationary and marine engines. Dr. Buchi is said to have further improvements which will be presented to the diesel manufacturers in the near future.

Advertising Manager for Alcoa

M. Russel Kambach has been named advertising manager for Aluminum Company of America, effective the first of last month, it has been announced by Arthur P. Hall, the company's director of public relations and advertising. Mr. Kambach, who has been assistant advertising manager since last year, will be succeeded in that position by Jay M. Sharp, of the Alcoa advertising department. A 1930 graduate of Carnegie Institute of Technology. Mr. Kambach joined Alcoa's advertising department in that year. In 1934 he was transferred to advertising activities of The Aluminum Cooking Utensil Company, a wholly-owned Alcoa subsidiary, returning to the parent company in 1936. Mr. Sharp joined Alcoa's advertising and public relations department in 1943.

General Electric to Launch "More Power to America Special" Train



Left to right: C. H. Lang, V.-P. in Charge of Sales, Apparatus Dept.; C. P. Fisher, Jr., Mgr. of Apparatus Exhibit Train Div.; and J. S. Smith, Mgr. of the Apparatus Department's Advertising and Sales Promotion Divisions.

The "More Power to America Special." first train of its kind in industrial history, will be launched on a nationwide tour this spring by General Electric's Apparatus Department. Exhibits of more than 2.000 electrical products, processes and techniques ranging from precise aircraft instruments to complex working models of steel mill, textile and other industry equipment, will be displayed throughout nine cars of the train. The train will visit the country's key industrial centers for inspection by utility and industrial executives and municipal leaders. Since it is an industrial development enterprise, it will not be open to the general public.

The exhibits will dramatize the latest apparatus and ideas for producing and using electric power most efficiently and represents one of G.E.'s greatest efforts to meet current selling conditions in highly competitive markets.

Years in the planning, the project has been a major activity in the company's apparatus advertising and sales promotion divisions. J. S. Smith, division's manager, said the extensive series of related exhibits, filling nine cars of the train, will represent the best combined thinking of the apparatus department's research, engineering, manufacturing and sales personnel. At the same time, he disclosed thata special group—the Apparatus Exhibit Train Division—was set up early last year as part of his organization with responsibility for preparation and operation of the train. This division is managed by C. P. Fisher, Jr.

The displays will portray the latest advances in power generation and methods and equipment for the profitable use of electricity throughout all industry. They have been designed especially for those who produce electric power and those who it to work in industry and the community.

Included in the exhibits will be turbines of all types-steam, gas and mercury; equipment for transmitting and distributing electric power, and motors and controls engineered into combinations that can perform a wide variety of industrial operations. Other displays will include precise measuring and recording instruments; new developments for community improvement, such as street lighting and

sewage treatment equipment, and products which contribute to national security.

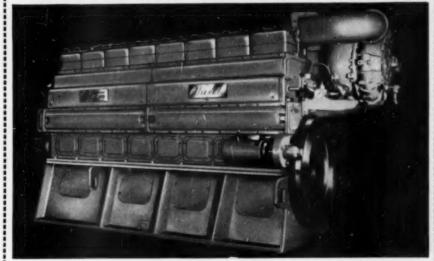
The train will be hauled by an Alco-G.E. two-unit, 4,000-hp, diesel-electric locomotive which itself will be part of the unusual series of displays. The cars are being built by the Pullman Standard Car Manufacturing Company.

New Unique Heater

A new and unique locomotive cab heater has been produced by Kysor Heater Company of Cadillac, Michigan. It can be used either with low pressure, high temperature steam or connected to the water supply as a regular hot water heater. This heater has a unit capacity of 85,000 btu. It provides approximately 700 cubic feet of 130° air per minute to the locomotive cab and in excess of 180 cfm. of defrosting air (at 130°) to the windshield.

This Kysor Heater is of rugged construction and is equipped with a core so built as to permit the maximum heat transfer and yet withstand temperatures under low pressure steam. Its stability is further enhanced by its electrical troubles. The Kysor Company has published a bulletin about their new heater which will be sent to anyone on request.

More POWER... Less SPACE STERLING VIKING DIESELS



This 8-cylinder turbe-supercharged Viking Diesel is conservatively rated at 750 hp. Starling
Diesels are available in five different models beginning at 100 hp.

DIESEL POWER

for all

INDUSTRY

AUTOMATIC POWER PLANTS
DRILLING RIGS — HOISTS
LOCOMOTIVES — PIPE LINES
G EN ER A TO R S ET S
FISHING CRAFT — DREDGES
LIFT BRIDGES — TOW BOATS
COMPRESSORS — AIRPORTS
YENTILATING SYSTEMS
P U M P I N G S T A TI O N S
SHOVELS

Sterling Viking Diesel engines offer definite advantages in:

Compectness . . . more power in less space. A high ratio of horsepower to weight.

Sturdy construction . . . one piece block and base. All working parts are easily accessible.

Dependability . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

Without cost or obligation, talk over your power requirements with an experienced Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.



STERLING ENGINE COMPANY

1270 Niagara St.

Telephone Lincoln 0382

Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

Largest REA Project to Operate First Super Engine

NEW ERA in rural electrification is being heralded by the opening of the \$2,900,000 M and A Electric Cooperative electric-power generating plant in Poplar Bluffs, Missouri. Considered to be the largest REA project of its kind in the country, the new M & A power plant will ultimately distribute over 25,000 kw., generated entirely by a new type of internal combustion engine. Heretofore on power generating requirements in excess of 10,000 kw., it has been generally considered necessary from an operating cost standpoint that steam driven turbine equipment be used. However, now, new and unique engine developments, only recently announced to the power

generating industry, greatly broadens the field in which internal combustion engines can successfully compete on a cost-per-kilowatt hour basis.

The first of several new type engines now being installed at the Poplar Bluffs station is known as the LSV-16 Cooper-Bessemer and develops over 3,400 hp. It is claimed to be the first engine of its kind in the world to operate entirely on diesel fuel oil, on natural gas alone or on any combination of fuel oil and gas. It will thus assure its operators of continuous, dependable performance regardless of any restrictions in fuel supplies. During summer months when gas supplies are abundant, the

LSV-16 will run as a supercharged spark-ignited gas engine, operating on low cost gas at fuel economies as low as 6,500 btu. per brake-horsepowerhour. Such economies are remarkably close to the maximum theoretical efficiencies considered possible today with internal combustion engines. In winter months when normally gas-rich areas like Missouri are subject to gas limitations or to cut-off entirely, the LSV-16 can continue to operate at unusual fuel economy as a dual-fuel engine. Dualfuel operation means it can run entirely on diesel fuel oil or any combination of fuel oil and gas as determined under conditions of restricted gas supplies. Engine controls automatically regulate the ratio of oil to gas depending upon supplies and varying from 100 per cent diesel fuel oil to principally gas, using as little as 2 per cent pilot fuel oil.

Dual-fuel, or gas diesel engines, as they are often called, are, of course, nothing new to the engine industry. The new type LSV-16 Cooper-Bessemer, however, is claimed to be the first engine development of its kind that now makes possible efficient, low cost engine operation either as a 4-cycle supercharged spark-ignited gas unit or as a gas diesel (dual-fuel) engine, according to Ralph L. Boyer, Cooper-Bessemer Vice-President and Chief Engineer. When operating on 100 per cent gas fuel, the new type engine, when compared with conventional gas engines, produces more than 80 per cent greater horsepower, while cutting fuel consumption by more than one-third. Likewise, when running as a gas-diesel, the LSV-16 performs under greater economies than can be achieved with ordinary diesels. Through compact V-type design, this engine now packs more horsepower per square foot of floor space than is normally produced with other equipment of comparable design. Where conventional engines develop only 9 hp. per square foot of floor space, the LSV-16 develops one-third more or 12 hp. per square foot of floor space. In power generating plants like M and A Electric Coopera-

New Booster Clutch

A new mechanical booster clutch that reduces lever pull more than 50 per cent for the operator has been developed by Koehring Company engineers for use on the Model 304 Koehring 3/4-yard excavator. This remarkable reduction in operating effort is made possible because the clutch is designed with two separate load carrying clutch bands, one of which helps to set the other. By actual measurement, it has been found that only about one-third to one-half the operating effort is required on the new clutch to produce an engine stalling load of what was previously needed on a straight manual clutch. Other important advantages produced by the new clutch include marked increases in production figures, simplified operation and longer life for the excavator and its machinery parts. The new booster clutch helps the operator retains a good "feel" of the load because the lever pull is directly in proportion to the pull produced by the clutch. Production increases, which have been noted, can be attributed to the introduction of a heat compensator spring that

tive, this means less building coverage and few engine foundations as well as lower cost in engine



Important Diesel engine builders and big scale users of engines reduce oil consumption, cost, and maintenance through use of MICHIANA Filters



Pair of 17400 Filters on common base costing. Each 50 H.P. capacity —combined, 100 H.P. Lubrication is improved, fewer oil changes required, engine parts kept clean and bearing wear reduced. All this adds up to better engine performance, greater overall efficiency, fewer overhaul jobs, and dollar-and-cents economy.

MICHIANA Filters are made in a wide range of capacities — to meet small and large engine requirements. Bulletin 45-D mailed on request.

MICHIANA PRODUCTS CORPORA-TION, Michigan City, Indiana.



Above: 163 H.P. Filter Model 17050 in which one standard Element is used.

Left: 653 H.P. Filter Model 19800 using four standard Elements. Other sizes of Filters up to 3266 H.P. using same Elements. MICHIANA
OIL FILTERS
For Diesel Engines

changes tension automatically. Full clutch efficiency is maintained at all times thereby, and any time losses for manual clutch adjustments are eliminated.

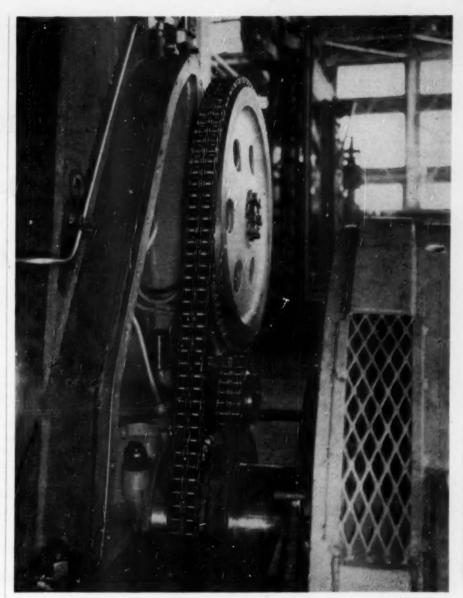
In addition, the heat compensator spring is a means for controlling the amount of power transmitted by the clutch to fit all applications and varying requirements for shovel, dragline, clamshell, crane or hoe work. Additional and complete information on the new booster clutch may be obtained by writing directly to Koehring Company, Milwaukee 16, Wisconsin, or by contacting local Koehring distributors.

Service Office for E-M

Rapid growth in application of General Motors locomotives on Eastern railroads has necessitated the opening of a new service office by Electro-Motive Division, it is announced by N. C. Dezendorf, Director of Sales. The new headquarters, to be known as the Washington Regional Service Office, has been opened in the Transportation Building in Washington, D. C. All Electro-Motive service activities for railroads in the southeastern section of the country will be directed from this point by Mr. F. H. Albert, newly appointed Regional Service Manager. The territory served by the new office heretofore has been handled by the New York Regional Service Office. Railroads in the northeastern segment of the country continue to be served out of New York, under the direction of Mr. W. A. Turner, former Assistant Regional Service Manager, now promoted to Regional Service Manager. Both the new Washington and the New York service offices will be under the jurisdiction of Mr. Paul Turner, Eastern Regional Manager for Electro-Motive Division at New York. Mr. O. L. Olsen, former Regional Service Manager at New York, has been promoted to Sales Engineer in the Eastern Region. Mr. A. J. MacNeal, former Assistant Manager of the Service Department Technical Section at LaGrange, has been appointed assistant to Mr. Albert at Washington. Mr. R. B. Johnstone, former manager of the Service Department Technical Section at LaGrange, is assistant to the Regional Service Manager at New York. The Service Department changes do not affect organization and procedures of the Electro-Motive Parts Department, Mr. Dezendorf pointed out.

Sales Manager for Enterprise

Appointment of Gerald C. Rasey as sales manager of the engine division. Enterprise Engine & Foundry Company, has been announced by James S. Watson, Enterprise general sales manager. A native of Beloit, Wisconsin, Rasey started as an apprentice engineer in 1918 while attending college, and in the intervening years has been continuously identified with the diesel engine field in both engineering and sales. During World War II, Rasey was one of the "iron men of Hendy," when he served with the Joshua Hendy Iron Works at Sunnyvale, Calif., as sales manager of the diesel department. The famed Hendy diesels are now the equally well-known Enterprise "H" series, widely used in both stationary and marine installations. Rasey is located in the San Francisco headquarters of Enterprise Engine & Foundry Company.



For Better Engine Design and Simplicity DIAMOND TIMING DRIVES

DIAMOND Roller Chain Drives involve fewer shafts and bearings; simple adjustments obviate need for extremely close centers.

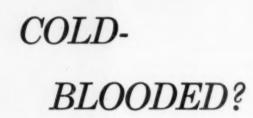
Quietness and long-life are due to uniform accuracy in chain manufacture plus the muting effect of the oil film within the chains. Inherent elasticity compensates for heat expansion of the engine. If replacement is ever required, new chain can be put over original sprockets with no major dismantling,—little or no "down" time. DIAMOND CHAIN COMPANY, Inc., Dept. 407, 402 Kentucky Avenue, Indianapolis 7, Indiana.

Offices and Distributors in all principal cities.

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are businessmen



OF COURSE NOT! Literally, their normal body temperature is 98.6-same as laborers, engineers or any other group of people. And, figuratively, they're no more, or no less, cold-blooded -as a group.

We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems-and people.

Let's not make the big-and costly-mistake, then, of generalizing on religious or racial groups. Adopt and carry out these common sense principles:

- 1. Accept-or reject-people on their individual worth.
- 2. Don't listen to or spread rumors against a race or a religion.
- 3. Speak up, wherever we are, against prejudice. Work for understanding.

Published in the public interest by:

Editor-DIESEL PROGRESS

Diesel Engine Conference

The Department of Naval Architecture and Marine Engineering of the University of Michigan sponsored a Great Lakes Marine Diesel Engine Conference at the University at Ann Arbor, at which time the ship owners and ship builders were invited to ask questions of a penal of representatives of the Diesel Engine Manufacturers Association who attempted to answer the questions. The panel started early afternoon and ran for three hours. Presiding over the panel was Captain L. A. Baier, head of the department of Naval Architecture and Marine Engineering. The Diesel Engine Manufacturers' representatives on the panel were:

Cooper-Bessemer Corporation	Edward Newell
Enterprise Engine & Foundry C	oGuy Wright
Fairbanks, Morse & Co	Gordon Anderson
Lima-Hamilton Corp	Lisle F. Small
The National Supply Co	John Newton
Nordberg Mfg. Co	Roland Bayerlein

The first part of the program was given over to answering some 20 questions that were sent in in advance. The second part was devoted to discussion and questions from the floor. The purpose of the meeting was to furnish the shipping interests of the Great Lakes with engineering facts concerning the practical application of diesel engines in this type of marine service.

Magnus Conducts Regional Conferences

The second of a series of six Regional Technical Sales Conferences for the field service representatives of the Magnus Chemical Co., Inc., was held recently at the Park Hotel, Plainfield, New Jersey. It was attended by the Magnus representatives in the middle Atlantic states. The sessions during the conference were conducted by Dave Blanchard, vice president in charge of sales, and were devoted to papers discussing the latest developments in modern methods of cleaning in the many industries serviced by the company.

The technical discussion was highlighted by a report given by Dr. R. W. Mitchell. Technical Director. in which he introduced several new products developed as a result of extensive research in the Magnus Laboratory. The group meetings were also addressed by D. P. Blount, Sales Manager, Chemical Division; A. W. Bowling, Sales Manager, Equipment Division; and R. D. Kreie, Advertising Manager. Additional conferences are scheduled for Chicago. Cleveland, Atlanta and Tulsa this spring.

New Division for American Machine & Metals

American Machine and Metals, Inc., announces the establishment of a new division through the acquisition of the Gotham Instument Company, Inc., of New York. This will supplement the line of pressure, temperature, electrical, flow and liquid level indicating instruments made by the United State Gauge Division, by the addition of a complete line of industrial recording and controlling instruments made by the Gotham Instruments Div.

Sales Manager for Brown Instrument

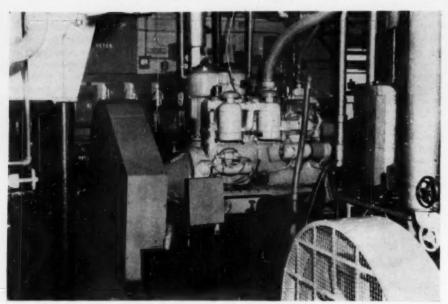
K. R. Knoblauch has been named manager of sales of valve products for the industrial division of Minneapolis-Honeywell Regulator Company, it was announced this month by L. M. Morley, Honeywell vice president and general sales manager of the company's industrial activities. Mr. Knoblauch joined Brown Instruments division of the company in 1924 in engineering work. In 1939 he was made assistant sales manager of the industrial division, the headquarters of which are in Philadelphia. Four years later he was placed in charge of market extension and sales promotion. He will continue to make his headquarters at the Brown plant.

Appointment at Allis-Chalmers

J. S. Morgan, engineer in charge of sales for the switchgear and control sections of Allis-Chalmers' electrical department since 1947, has been named manager of the switchgear section, according to an announcement by R. M. Casper, manager of the electrical department. Management of the switchgear and control sections since 1946 has been under the direction of Frederick C. Ludington, He continues as manager of the control section. Morgan has been associated with Allis-Chalmers since his graduation in 1935 as an electrical engineer from Purdue University. He is a member of the American Institute of Electrical Engineers and the Engineers' Society of Milwaukee.



Diesel Does Double Duty Work



The American Ice Company, Sacramento, Calif., has overcome the seasonal handicap common to the commercial ice business by operating an ice skating rink next door to its ice plant. Except for the three peak summer months, the rink is open continuously, and provides the company with additional revenue when the ice business is at its lowest ebb. During the summer months the rink is closed so

that all of the equipment can be used to produce commercial ice.

Doing double duty in this enterprise is the 150 hp. diesel engine that drives a York ammonia compressor. The compressor has an $81/2 \times 81/2$ -inch bore and stroke, two cylinders, and can produce 20 tons of ice per day. Besides the diesel, which turns at a

maximum rpm of 1,400 and has run almost continuously since it was installed in April, 1948, American also uses two electric driven compressors. Total output capacity of the plant is 37 tons per day.

The Cummins diesel keeps the 10,500 sq. ft. rink frozen by itself. In the winter season, American runs the engine at 900 rpm. for only 10 hours to freeze the rink completely and keep it in good shape for a 24-hour period.

Appointment at Gulf Oil

Mr. R. W. Van Sant, Jr., has been appointed Chief Fuels and Lubricants Engineer, Diesel Engine section, Industrial Products Engineering of the Gulf Oil Corporation, Pittsburgh, Pa. Mr. Van Sant was graduated from Muskingum in Physics and Chemistry in 1935 and received his M.S. degree in 1936 from the Massachusetts Institute of Technology. He joined the Gulf organization in 1938 as an Industrial Lubrication Engnieer at Toledo and served in that capacity until he went on active duty in the U. S. Navy in October, 1941. His naval assignments in engineering included installations of machinery aboard ship at Philadelphia Navy Yard, teaching Diesel Engineering at Pennsylvania State College and diesel engine development work at the U.S. Naval Engineering Experiment Station. Annapolis, Maryland. He was subsequently released to inactive duty with the rank of Lieutenant Commander and returned to the Gulf organization as a lubrication engineer in the general offices of their Lubricating Sales Department at Pittsburgh.

"THE half of IT"

Sheppard Diesels consume HALF as much fuel per hour as gasoline engines

Sheppard Diesels run on any one of 15 fuels, most of which cost less than HALF the price of gasoline

Sheppard Diesels operate 3 to 5 times longer between overhauls —cut down-time by a lot more than HALF . . . until you hear about Sheppard Diesels



45 H.P. 3 Cylinder Power Unit with power toke-off and clutch. Also available as 2 to 36 K.W Generating Set.



Skeppards
THE DIESEL
STATIONARY · AUTOMOTIVE

SHEPPARD DIESELS, HANOVER 8, PA.

DIESEL ENGINE CATALOG

The purpose of this little advertisement is to chat with you for a few moments about why YOU should have a copy of this splendid reference book available when YOU need it. For fifteen years it has been referred to as "the bible of the industry."

All of the smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar—the Diesel Engine Catalog gives them full, detailed information when they need it most and need the data to be accurate.

The Consulting Engineer keeps this book in his reference file. It immediately gives him ALL diesel engines coming within a given horsepower range, speed range, weight range.

People who sell, people who buy, people who use diesel engines need this book. Will you order this book today? Price \$10.00 prepaid.

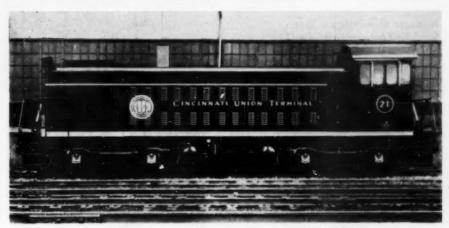
DIESEL ENGINE CATALOG

816 North La Cienega Boulevard LOS ANGELES 46, CALIFORNIA

Locomotives On Their Way

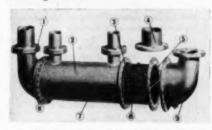


This is the first of ten 120-ton diesel switching locomotives being delivered to the Baltimore and Ohio Railroad by Lima-Hamilton Corporation, from its Lima Locomotive Works Division, Lima, Ohio. The locomotives are to be assigned to the B. & O.'s Toledo division, with six at Dayton, and two each at Hamilton and Lima. The B. & O.'s ten are a part of 35 diesel switchers which have been delivered to the Nickel Plate, the Eric, the New York Central, Cincinnati Union Terminal, and Toledo, Peoria & Western. Other locomotives are now under construction for the Pennsylvania Railroad.



First of two 750 hp. diesel switching locomotives being delivered to the Cincinnati Union Terminal Company by Lima-Hamilton Corporation, from its Lima Locomotive Works Division, Lima, Ohio. The new 100-ton switcher, with an engine rated at 950 rpm. is, as far as possible, a duplicate of Lima-Hamilton's 1,000 hp. design for maximum interchangeability of parts between the two models.

Young Announces New Heat Exchanger Line



Expanding its redesigned line of heat exchangers available from stock, Young Radiator Company of Racine. Wisconsin, announces its new Type "R" (removable tube bundle) shell and tube heat exchangers. Young type "R" heat exchangers are of corrosion-resistant Admiralty metal tubing. Larger tube sizes (%-inch OD and %-inch OD), plus en-

gineered tube spacing and baffling, provide longer unit life, easier maintenance, and maximum heat transfer efficiency. The line consists of both single and two-pass models in a wide range of capacities.

The units have been especially designed for: Engine Cooling-Engine jacket water and lube oil; Oil Cooling-Bearings, machine tools, reduction gears, pumping units, turbines, cutting oil, quenching oil, transformers, industrial hydraulic equipment, generator sets, etc.; Miscellaneous Fluid Cooling-Fresh water, salt water, torque converter fluid for power cranes, busses, trucks, oil field drilling rigs, rail cars, etc.

Full details on Young type "R" heat exchangers, including capacities, dimension data, etc., may be obtained by writing the company requesting Catalog No. 1149.



Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:

1 to 30,000 RPM

Specialists on Couplings for more than 30 years



THE THOMAS PRINCIPLE GUARANTEES
PERFECT BALANCE UNDER ALL
CONDITIONS OF MISALIGHMENT,
NO MAINTENANCE PROBLEMS.

SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO. WARREN, PENNSYLVANIA

Electrical Drive Best for Locomotives

The locomotive of tomorrow will be electrically driven, whether it receives its power from a trolley, a steam turbine, a diesel engine, or a gas turbine, according to A. H. Candee, transportation specialist for the Westinghouse Electric Corporation. Speaking before the Denver, Colorado, section of the American Institute of Electrical Engineers, Mr. Candee said that electric motor propulsion of rail vehicles has capabilities and advantages unsurpassed by any other form of drive. Rising labor and material costs are spurring railroads to more economical operation and this quest is aimed largely at the development of new and more efficient types of locomotives.

The diesel electric has virtually captured the railroad and industrial switching fields because of its improved performance and economy. While it may have to share the high-power locomotive field with the gas-turbine locomotive at some future date, there is still a wide field of application in all types of service.

"Heavy" Dana to Raleigh

The department of diesel and internal combustion engines at the University of North Carolina has procured as a member of its staff in the capacity of special lecturer, Captain M. M. Dana. As many people in the diesel industry know, Captain Dana has been integrated for many years with diesel de-

velopment in the United States, having served as chief of the diesel section of the Bureau of Ships and also in many other assignments involving diesels in the United States Navy. In addition to conducting a series of special lectures dealing with diesels, Captain Dana is participating in the university's research programs as well as programs of study built around graduate students. In addition to this, he is also conducting a consulting practice in the diesel field.

Manager of Houston Office for Marley



James W. Elizardi

James W. Elizardi has recently been made manager of the Houston sales office of The Marley Company, Incorporated. Mr. Elizardi, who is a graduate of Tulane University, previously worked for the Griscom-Russell and the Illinois Central Railroad, and will make

his home in Houston, Texas. The Marley Company is one of the largest manufacturers of water cooling towers.

Manager of Switchgear Section for Allis-Chalmers

J. S. Morgan, engineer in charge of sales for the switchgear and control sections of Allis-Chalmers'

electrical department since 1947, has been named manager of the switchgear section, according to an announcement by R. M. Casper, manager of the electrical department. Management of the switchgear and control sections since 1946 has been under the direction of Frederick C. Ludington. He continues as manager of the control section. Morgan has been associated with Allis-Chalmers since his graduation in 1935 as an electrical engineer from Purdue University. He is a member of the American Institute of Electrical Engineers and the Engineers' Society of Milwaukee.

Refresher Course at Sealed Power

Complete "refresher" courses for zone and district managers of the Sealed Power Corporation. Muskegon, Mich., were held throughout February in a series of coast-to-coast meetings under the direction of home office officials. West coast field personnel gathered at the St. Francis Hotel, San Francisco, on February 6, 7 and 8 for their meetings, while mid-west and southern representatives attended meetings in the La Salle Hotel, Chicago, February 13 to 19. The conference closed at the Statler Hotel, New York, on February 25, 26 and 27. John E. Norwood, Sealed Power's sales manager, was in charge of the annual conferences. He was assisted by Harold Baldwin, marketing and research manager; Richard E. Murbarger, director of distribution: Victor Paquin, service manager: Charles H. LeFebre, advertising manager; and Edward Gray, assistant sales manager.



U.E.I. graduates are energetic, ambitious Dieselthinking men.

Our thorough practical training in operating, maintaining and repairing of Diesel equipment gives these graduates sound fundamentals . . . couple this to their faith in Diesel's future, and you have the kind of men you want to grow with you.

Such men are available for any part of U. S. and Canada. Just let us know your needs.

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STEADY VOLTAGE When and Where You Need It!

• With E-M Packaged Generators, you can generate the same kind of steady, dependable voltage you expect from a big-city power line . . . quality voltage that keeps lights bright and machines and appliances working smoothly, evenly.

Combining meters, exciter, generator and voltage regulator in a compact unit, Packaged Generators are an original E-M development. Ratings range from 3.75 to 187 kva.

Our publication Synchronizer 27 is packed with illustrations of on-the-job applications of this E-M packaged power. Send for a free copy.

ELECTRIC MACHINERY MFG. COMPANY





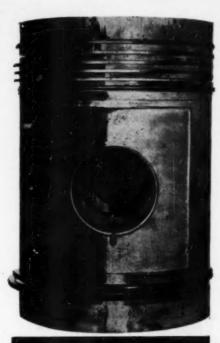
The largest Crankshaft Grinding Machine in the world used in an independent repair shop

Four machines giving range from the smallest up to crankshafts with stroke of 15" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts.

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 Prompt Service . . . Accurate Work

Established 1924 . . . 28 years experience grinding crankshafts!

NATIONAL WELDING
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THE MOST COMPLETE ENGINE REQUILIDING SHOP



Decarbonize Aluminum Pistons FASTER!

Removing products of combustion from aluminum pistons, piston rings, connecting rods can now be done faster, easier, more economically with Oakite Composition No. 61. Safe to surfaces, used in cold solution form, Oakite Composition No. 61 quickly removes dirt, oil and carbon... leaves clean surfaces for speedy, accurate inspection before engine repair or overhaul.

Technical Data is FREE

You can get step-by-step directions on decarbonizing steel and aluminum pistons merely by writing address below. Or, if you prefer, on-site service is freely available to handle this work or any other Diesel maintenance cleaning operation necessitating immediate action. Consult Oakite today!

ALSO get data on:

- Cleaning Heat Exchangers
- Filter Cleaning
- Paint Stripping
- De-scaling Compressors
- Renovating Painted Equipment



OAKITE PRODUCTS, INC., 22D Thames St., NEW YORK 6, N. Y. Technical Service Representatives in Principal Cities of U. S. & Canada

Two New Adjustable Wrenches



For the first time two alloy steel, drop-forged adjustable wrenches embracing larger sizes never before included in this type wrench have just been announced by the Owatonna Tool Company, Owatonna, Minnesota. These two wrenches adjust to 29 sizes which normally must be serviced by fixed size, carbon steel wrenches. The smaller wrench, No. OA-24, is 24 inches long, %-inch thick and weighs only 10 pounds. The large wrench, No. OA-36, is 36 inches long, 11/4 inches thick, and weighs only 22 pounds. The smaller wrench adjusts from 13/4 inches to 23/4 inches, while the larger wrench adjusts from 2-15/16 inches to 43/4 inches. These tools reduce the weight and bulk usually necessary for a service or maintenance man to carry. For further information, write your nearest OTC jobber or directly to the Owatonna Tool Company, 415 No. Cedar Street, Owatonna, Minnesota.

Appointed Dealer for Chrysler Industrial

Stewart & Stevenson Services Inc.. Houston, have recently been appointed industrial dealer in Texas for Chrysler Industrial Engines, Joe Manning, Manager, Stewart & Stevenson Services, Inc., announced recently. The new line of Chrysler Industrial Engines as well as complete parts and service will be available from all the Stewart & Stevenson branches, Manning said. The line will include gas, gasoline and butane engines especially suited for irrigation pumping, oilfield pumping and general industrial service.

Among ten men in the United States to be chosen by General Motors Corp., Detroit diesel engine division, to receive national recognition for outstanding achievement in GM diesel engine sales was N. N. Elkins, salesman for Stewart & Stevenson ervices, Inc. The award is made every year to the top GM diesel salesmen in each of 10 United States zones of operation.

New Booklets by Enterprise

Enterprise Engine & Foundry Company has available a new 4-page bulletin on its new series of dual fuel engines. This two-color bulletin describes in detail the simplified control and gas admission systems for the DGSG and DGSQ series Enterprise engines designed to efficiently handle natural gas, butane or butane-propane mixtures, manufactured or sewage gas as well as desel fuel. The bulletin carries clear illustrations and descriptions of the working parts of this dual fuel system.

A new 8-page, two-color bulletin, featuring the Enterprise "H Series" stationary diesel engines, is now off the press. These engines, formerly known as the "Hendy 30 Series," range from 135 to 265 hp. at 600 to 900 rpm. in 6 and 8 cylinders.



Why Risk Broken Crankshafts? THE BEEKMAN CRANKSHAFT ALIGNMENT INDICATOR

"The sturdiest gauge of its kind in the world"

- · Checks crankshaft alignment with split hair accur-
- . Is Applicable to All Gasoline, Dual-fuel and Diesel



Specifications

- Dial 1½" diameter, graduated in 1/1000ths" plus or minus 25.
- Spacer pieces allow for 21/4" to 18" range be-
- A precision instrument in standard use by Surveyors of leading Insurance Companies and prominent Engine Manufacturers.

Diesel Plant Specialties Co.

Stevens Point, Wisconsin



CUT REPAIR AND REPLACEMENT COSTS!

Five vital steps in the WELDIZE process of repair:

EXAMINATION FOR BREAKS AND FATIGUE ANALYZING ALL BREAKS WELDING WITH HEAT AND WEAR RESIS-MACHINING

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Hauling at a Saving



Greenbrief Dairy Products Company, Beckley, W. Va., uses this International to haul bottled milk on the Beckley-Logan run. The tractor, which entered service in September, 1949, is powered with a 165-hp. Cummins diesel and pulls a 32-foot Fruehauf tandem trailer. The tractor-trailer combination makes one round trip a day, six days a week, on the 148-mile mountain haul, carrying bottled milk to Logan and cases of empty bottles on the return trip. The round trip is made in seven hours, including loading and waiting time.

W. H. Carney, Maintenance Superintendent for Greenbrier Dairy Products, reports that the diesel has made significant reductions in fuel costs compared to gasoline power in the same service. The 165-hp. diesel uses only 18 gallons of diesel fuel per round trip. Gasoline-powered trucks on the same run use 35 gallons a round trip.

Porous Stainless Steel Surfamax Filters



A new Surfamax porous stainless steel filter supplying a maximum filter area in a small container, is now available to the industry. The filter elements are in the form of corrugated assemblies, having the general shape of an accordion. Available in six pore open ings, ranging from 5

microns (.002-inch) to 165 microns (.0065-inch), these stainless steel filters offer uniform pore sizes, closely limiting the size of the particle which can pass through the filter. Unusually high throughput rates are obtained for liquids and gases because of the high percentage of voids. For simplified servicing, a single nut opens the filter container and the filter element may be removed in a matter of seconds. Units are highly polished for easy cleaning.

Standard units with pipe connections ranging from 1/4-inch to 2-inch are available. Units supplied on special orders up to 10-inch pipe size and in capacities up to 10,000 gallons per minute. For additional information, illustrated bulletins, etc., write to the manufacturer, Micro Metallic Corporation, 193 Bradford Street, Brooklyn 7, New York.

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NOTICE TO DISTRIBUTORS

One of the largest manufacturers of diesel engines in England is actively preparing to enter the American market with a line of lightweight, air-cooled engines, 8 to 11 hp., of exceptionally high quality materials and workmanship, priced competitively. This concern is interested in first rate distributors from Coast to Coast. For full particulars write Box 380, DIESEL PROGRESS, 2 West 45th St., New York 19, N. Y.



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Changes at Fairbanks-Morse

Two changes in branch house management organization were recently announced by Fairbanks, Morse & Co., Chicago manufacturers.

J. C. Elmburg, who has for the past three years been manager of the Atlanta branch, has been transferred to Portland, Oregon, where he has assumed the duties of branch manager, succeeding Howard Oxsen, who is returned to San Francisco to be manager of diesel engine sales in that area.

George A. Hawkins has been appointed manager of the Atlanta branch. Mr. Hawkins has, for the past several years, been manager of the company's sub-branch at Minneapolis.

New Bulletin by AAF

The American Air Filter Company of Louisville, Ky., has published a new manual covering new designs and improvements in their Cycoil Oil Bath air and gas cleaners. New sizes have been added to the WOl air cleaner series and a new design (WO3) has been introduced. The WO3, identical with the model WOl except the intake is tangential instead of peripheral, permits control of the air intake or the addition of an extension for use with an intake unloading compressor. Both the UO4 (low pressure) and the UO7 (high pressure) gas cleaners have been re-designed for wider ranges of working pressures.

This bulletin is profusely illustrated with charts, dimensions and detailed engineering data on all nine sizes of American Air Filter's line of cleaners. The bulletin is offered free upon request by writing to American Air Filter Company, Inc., Louisville, Kentucky.

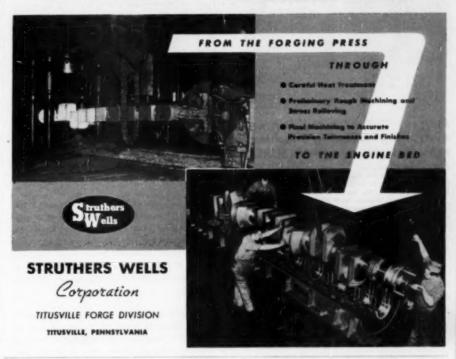
Manufacturing Plant on Wheels



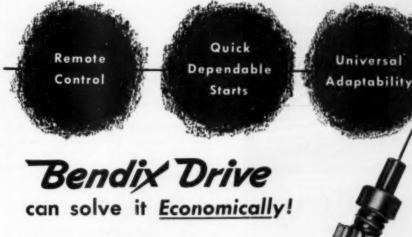
The Daffin Feed-U-Nit (trade mark), produced by Daffin Manufacturing Company of Lancaster, Pa., uses a Buda diesel engine. This unit is a complete feed manufacturing plant on wheels. It may be mounted on any 1½-ton truck. The Daffin Feed-U-Nit is a continuous tor batch mixer. It mixes molasses and concentrates with the feed in the grinding process, and also bags the feed in one dustless operation. A major distributor of the unit is Lancaster Engineering Corp., a Buda distributor and affiliate manager of the Daffin Manufacturing Company.

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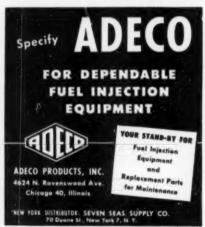


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WEST COAST DIESEL NEWS

By FRED M. BURT

A LARGE order of 158 Model L, 250-hp. Cummins diesel engines purchased by the United States Government will be used to power radar equipment for the warning screen to be set up around the west, northwest and other strategic areas.

THE FIRST of the new model Cab-Over-Engine Sterling trucks, powered with 200-hp. Cummins diesels, sold by Sterling Truck Co., Los Angeles, went to Lonnie Case. Fresno trucking contractor.

DESIGNED by Wilvers & DeFever, San Pedro naval architects, 91-foot tuna clipper, Cape San Vincent, for Capt. Vincent Gann, will be built by Tacoma Boat Building Co. and powered with a 400-hp. Enterprise diesel; two 165-hp. G.M. auxiliary diesels; pumps and motors supplied by Fairbanks, Morse.

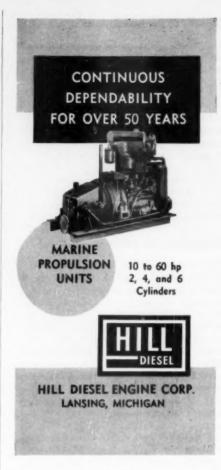
FROM the yards of Long Beach Machine Repair Co., new, 100-foot wooden tuna clipper Marilyn Rose, built for owner-skipper Anthony Brown, San Diego, at a cost of \$235,000, is powered with a 500hp., 8-cylinder Fairbanks, Morse diesel; auxiliaries a pair of G.M. 60-kw. diesel generating sets; refrigeration by Worthington; pumps are Fairbanks, Morse.

TWO 65-foot combination salmon and herring seiners, designed by H. C. Hanson, Seattle, for Canadian Fishing Co., and a similar boat for Frank Tomasich, all now on the ways of Sterling Shipyards, Ltd., in British Columbia, will have 250-hp. diesel engines; two will be Budas, the other not selected as vet.

CONVERSION of 121-foot old-time Seattle fireboat Duwamish, virtually rebuilt at Commercial Ship Repair yards, Winslow, Wash., was converted from steam to diesel-electric power, and is now reputed to be the world's most powerful fireboat, with pumping capacity of 24,000 gpm.; propulsion and pumping powered with three Cooper-Bessemer. 950-hp. diesels, each driving 610-kw. G.E. generators powering four 765-hp. G.E. motors.

AT PORT Orchard (Wash.) marine railway, Capt. Jas. M. Van Alstyne's 64-foot Port Orchard ferry Concordia was re-powered with a 500-hp., 8-cylinder General Motors diesel; a 2-cylinder Buda auxiliary was also installed.

A NEW 40-foot welded steel troller and combination boat designed by Naval Architect H. C. Hanson, Seattle, for William Roon, of San Francisco, will be powered by a 100-hp. Buda diesel with 3:1 reduction gear.



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For a long-established, widely-known line of British diesel engines, 7 to 150 BHP, 800 to 1200 R.P.M., for all purposes. These are heavy duty engines of simple yet robust design and manufacture suitable for power application, marine propulsion and marine auxiliary drive, generator drive, emergency fire pump drive and a wide range of industrial uses. We are prepared to supply complete units in the above categories, arranged for either air or electric starting at prices set to attract the American Trade.

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A full range of sizes from 1/16" to 1¼", National Pipe Thread Fuel, is available. Full details are given in Bulletin 675.

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A NEW 112-foot all-brine tuna capper under construction by Martinac Ship Building Co., Tacoma, for their own account and a San Diego co-owner, will be powered with a 615-hp. Superior diesel, with three 3-cylinder Model 678A G.M. diesel auxiliaries.

ELEVEN Minneapolis-Moline natural gas, 60-hp, engines installed by Tide Water Associated Oil, Co. in the Ventura, Calif., field, and used for pumping crude oil under high pressure to Kobe pumping units at the bottom of the wells to raise crude oil to the surface, have been equipped with Engineering Controls' Vapor Phase units to use jacket water and exhaust heat to produce nearly 2,500 pounds of steam per hour to keep the high pressure oil heated to about 200 degrees F.

INSTALLED by Shepherd Diesel Marine, San Diego branch, a model MG-201 Twin Disc 3:1 reduction gear on Sam and Andrew Carrao's Albacore boat Rev.

FOR King's County Trucking Lines, San Francisco and Los Angeles, five new Sterling short wheel-base trucks powered with 200-hp. Cummins diesels, and to pull two trailers on inter-city hauls, purchased from Sterling Truck Co., Los Angeles.

BUILT at Frank Hyman's United Boat Builders Works, Fort Bragg, Calif., for Capt. and Mrs. Lank Grunert, 38-foot combination boat Faneg is powered with a General Motors 85-hp. diesel with 3:1 reduction gear, from West Coast Engine & Equipment Co., Fort Bragg branch.

SUPPLIED and installed by Shepherd Tractor & Equipment Co., Los Angeles, a 110-hp. at 1800-rpm., D-518, "Caterpillar" diesel to re-power a 25-ton Brown hoist for Berg Metals Co., Los Angeles, to replace steam power. Used for handling scrap with a magnet.

AT FELLOWS and Stewart yard. Terminal Island, 83-foot Addisonia, former Coast Guard boat, converted for pleasure and fishing vessel, owner Addison Brown, Los Angeles, has been re-powered with two 275-hp., 6-cyl. Cummins diesels, from Cummins Sales & Service, Los Angeles.

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The new Elliott high-pressure turbocharger has actually been in use for some time. An example is the Lima-Hamilton engine, illustrated, which is typical of new designs of four-cycle Diesels operating at BMEP of 165. The new turbocharger incorporates design improvements insuring long life, trouble-free operation, and ease of maintenance.

Full details at your request. Write.



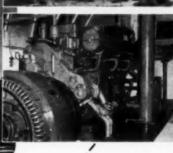


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Above. leit: "David E. Philips". "Margaret". "Alden S. Swam" and "William S. Bruster". 125' to 130' over-all. all repowered from 1944 to 1947 with Cooper-Beassman direct-reversing diesels runging from 515 to 730 hbp.

Above. right: Exterior and interior view of dissol-electric plant. powered by a supercharged Cooper-Bessemer \$65 hp 13-6 dissel driving a 600 kw Elibot generator. Radiators adjacent to power house cool engine jacket water and water for lube oil cooler.

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